FuturesLab 2021

AEC Foresight Workshop

Distributed Summer 2021

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On July 6th 2021, Chandos Construction and OCAD U CO brought a diverse group of 40 AEC industry stakeholders from across North America together to have a conversation about Signals of the future, from writ large at a societal level down to specifics about the AEC space. This report captures the outcomes of that conversation, containing observations, recommendations, and the signals of the future on which the discussions were based.

Table of contents

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One can have only as much preparation as he has foresight.

-Jim Butcher, Author

Although the future is unknown, there are a few things we can say with certainty. The impacts of climate change are far-reaching and significant: they are already felt in many different ways around the world. The ways in which we collaborate within and across our industries is shifting— the move to distributed work as a result of the COVID-19 pandemic has already given illuminated new and hybrid ways of working. Technology continues to evolve at an exponential rate with Artificial Intelligence at the leading edge, moving us closer to what has only existed in many science fiction novels until now. In evaluating the Signals prepared through the FuturesLab research process and workshop, we can see the present changes and signs of the future that are quickly growing in prominence and influence.

The questions we grappled with in FuturesLab and its preceding research invite us to collectively examine the extent to which these changes may evolve— peak impact, certainty of significance, influence on the Architecture, Engineering and Construction (AEC) industry, as well as the ability the AEC industry has to exert a meaningful response in an ever-changing world.

The research leading up to FuturesLab included a horizon scan of over 200 trends shifting our current world. These trends were then supplemented by over two dozen research interviews with experts in the AEC industry, before culminating in a collaborative event where experts discussed and evaluated the Signals of the future that emerged. The FuturesLab event highlighted a

clear need to consider the implications of these Signals as standalone macro changes. In addition, the Signals prompted an examination of the intersection of Signals and the possible resulting impacts for individuals, societies and organizations at local and global levels. Considering these different possible interactions is a form of scenario development (illustrated in Madeline Ashby's story - see Appendix A) and has long been an organizational strategy technique to make sense of complexity and can be used to better anticipate and understand emerging changes happening at multiple layers of society.

By imagining how the Signals might intersect, over different time horizons, we can then place ourselves as individuals or as organizations in each of these scenarios and consider the opportunities and challenges that might not have been previously evident. By working through this type of exercise, we can then build a view of what a more desirable or preferable future might look like and how we might get there, and in contrast— what a less desirable future might look like. This stress-testing activity is increasingly important as it can pin point strategic decisions across an organization or industry.

The AEC industry has an imperative to be part of the change that we want to see in the world. Increasingly, we must work within the tensions of economic growth and planetary decline, of technological evolution and the need for greater human connection, of increasing mistrust of institutions and and the need for safer workplaces that promote greater inclusivity. The need for a greater understanding of the future, and resilience in the face of change can no longer be ignored.

What we Learned: Key Insights and Recommendations

The following pages outline the key insights that emerged from six months of research, trend scanning and expert interviews leading up to FuturesLab 2021 as well as the collaborative FuturesLab event itself.

FuturesLab research and outcomes suggest several important questions AEC industry stakeholders must address.

We are at a tipping point where there is an opportunity for the AEC industry to become a significant leader in shaping each of the following tensions for the betterment of our current and future generations. Pursuing new models of collaboration, piloting new ways of integrating AI technologies into workflows, leading the way in fostering spaces where diversity of thought and expression can flourish, and designing the built environment in a way that supports environmental growth, not just economic. With bold actions, informed by strategic foresight, it is not hard to imagine many possible worlds where we flourish together.

Strategic foresight does not predict the future but seeks to prepare us for uncertainty by helping us think systematically about the possible and plausible futures that lay ahead. That preparation can effectively take the form of questions, and attempting to answer them can help direct paths of possible action. We suggest every organization in the AEC space would be well served by grappling with the following seven questions that emerged from the signals and FuturesLab 2021.

1. What is your climate action plan?

Across the board, **Climate Crises** was recognized as the Signal to watch, and one that will continue to have long and enduring impacts on the AEC industry. FuturesLab research showed a certain and significant impact to society at large, a sense of urgency for the AEC industry to respond, and importantly, a perceived high ability for the industry to do so.

2. How will your digital and physical worlds interact?

Throughout the FuturesLab process, **Metaverse Migration** was identified as

a possible challenge, and opportunity for the AEC industry in the coming decade. The research uncovered a collective perspective that there are very likely important implications of a future virtual and physical world integration that will be critical to watch over the next few years. Among those implications, the most provocative concerns whether the rise of a persistent digital world may become a "competitor" to the physical world.

3. Are you becoming effective collaborators?

Throughout the COVID-19 pandemic, digital collaboration has quickly become a norm made possible by a plethora of common and emergent technological tools. The FuturesLab research highlighted that technology will be just one part of the future of **Collaboration Evolved**, with the most successful organizations being those that are able to foster significant diversity, equity, and inclusion to develop the most innovative solutions and transformational work.

4. How will you integrate the best of technology with human ingenuity?

Emerging technologies like artificial intelligence, virtual reality, and "Internet-of-Things" devices can usefully augment our approach to work and collaboration if used thoughtfully. Without cautious deployment, we run the risk of implementing biased AI or opaque algorithms that take the human being out of the creative, decision-making loop. While many emerging technologies are already in use in the AEC industry—a sign of us moving towards **AI Everywhere**, we should always be willing to examine our tools and practices to determine if our approach is the best available for ourselves and our stakeholders.

5. How can you foster greater diversity, equity, inclusion, and decolonization in your work-- at the organizational, team and individual levels?

We're in the midst of a societal transformation in which longstanding institutional forms of power and privilege are being questioned and overturned in an effort to bring about a more just and equitable world for

everyone. And while the AEC industry is often perceived as lagging behind others in this process, there is much we can do as leaders and influencers to make space for emerging voices and **Diverse Identities**. This is the right thing to do as well as being good for the industry. As we face down a skilled worker shortage, the natural place to seek to nurture the next generation of talent is in communities that have historically been under-represented in our industry.

6. What impact might declining institutional trust have on our industry, and how might we start to act today to maintain and improve our stakeholders' trust in our work?

Trust in cornerstone societal institutions—from governments to police and banks to media—has been on a steady, decades-long decline due to a combination of high-profile failures and scandals coupled with increasing public scrutiny enabled by new communication technologies. The AEC industry's public reckoning may come sooner than we think. Issues like aging, failing infrastructure, sub-standard building practices, increased environmental stressors from climate change, and poor global labor standards for the industry may lead to events that further contribute to **Declining Trust**—effectively shaking the public's trust in the industry.

7. What new opportunities and business models are emerging for your organization as the world becomes more urbanized?

More of the world's people move to the world's cities with each passing year. In thirty years, roughly one in three people on Earth will be living in an urban environment. Many people move to cities seeking opportunity—after all, they are cauldrons for innovation and engines of prosperity. At the same time, ever-denser urban landscapes and an increasingly **Urbanized Earth** present unique opportunities for those of us who design and construct the built environment to create spaces that promote health and community.

Collective Industry Intelligence

FuturesLab Participant Discussion Group Voting Results.

We don’t know what we don’t know—but that doesn’t mean we shouldn’t try.

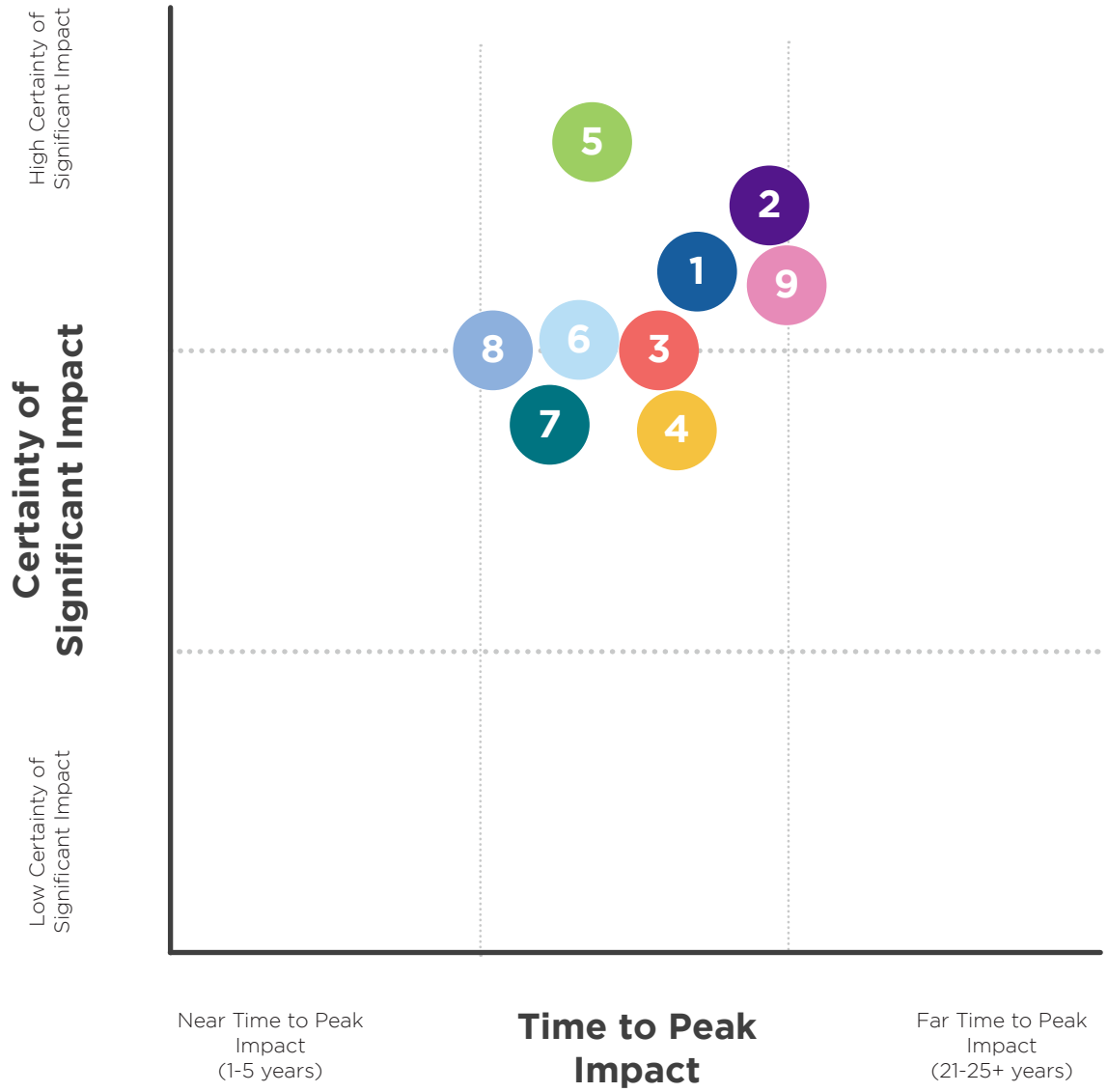
FuturesLab 2021 was a collaborative virtual session hosted by Chandos Construction that brought together experts and colleagues from across the Architecture, Engineering and Construction (AEC) industry. Prior to the session, participants were introduced to 17 Signals shaping our future, ranging from emerging technologies to growing socio-political divides and aging populations. In a series of pre-FuturesLab sessions, we asked participants to provide reflections on which Signals they felt were most alarming or, alternately, most exciting. We then drew on these reflections to narrow the field down to a set of nine provocative, distinct, and wide-ranging Signals that would form the basis of our FuturesLab conversations.

During FuturesLab, participants discussed, analyzed, and individually voted on each Signal in a series of conversations structured around several dimensions exploring how our Signals might shape the future, including:

- When each Signal might reach its peak impact on society and the certainty of it having significant impact;
- How much impact each Signal might have on the AEC industry;
- How urgent it is for the AEC industry to respond to each Signal, and to what extent the AEC industry has an ability to do so.

The results of these discussions showed both the diversity of thought that participants brought to FuturesLab and the collective perspective developed throughout the event, as well as informed the questions in the preceding section. The following pages document voting outcomes in the five different conversational dimensions. Organizations would be well served to consider their own stance on the relative positioning of the various signals in these contexts.

When will this Signal reach its peak impact on society, and how certain are you that its impact will be significant?



Signal Legend

1. Urbanized Earth (Signal 01)
2. AI Everywhere (Signal 02)
3. Regenerative Commerce (Signal 03)
4. Metaverse Migration (Signal 05)
5. Climate Crises (Signal 06)
6. Have and Have Nots (Signal 08)
7. Collaboration Evolved (Signal 09)
8. Declining Trust (Signal 15)
9. Developing Nations Rising (Signal 16)

Session One Voting Results

Time to Peak and Certainty of Significance

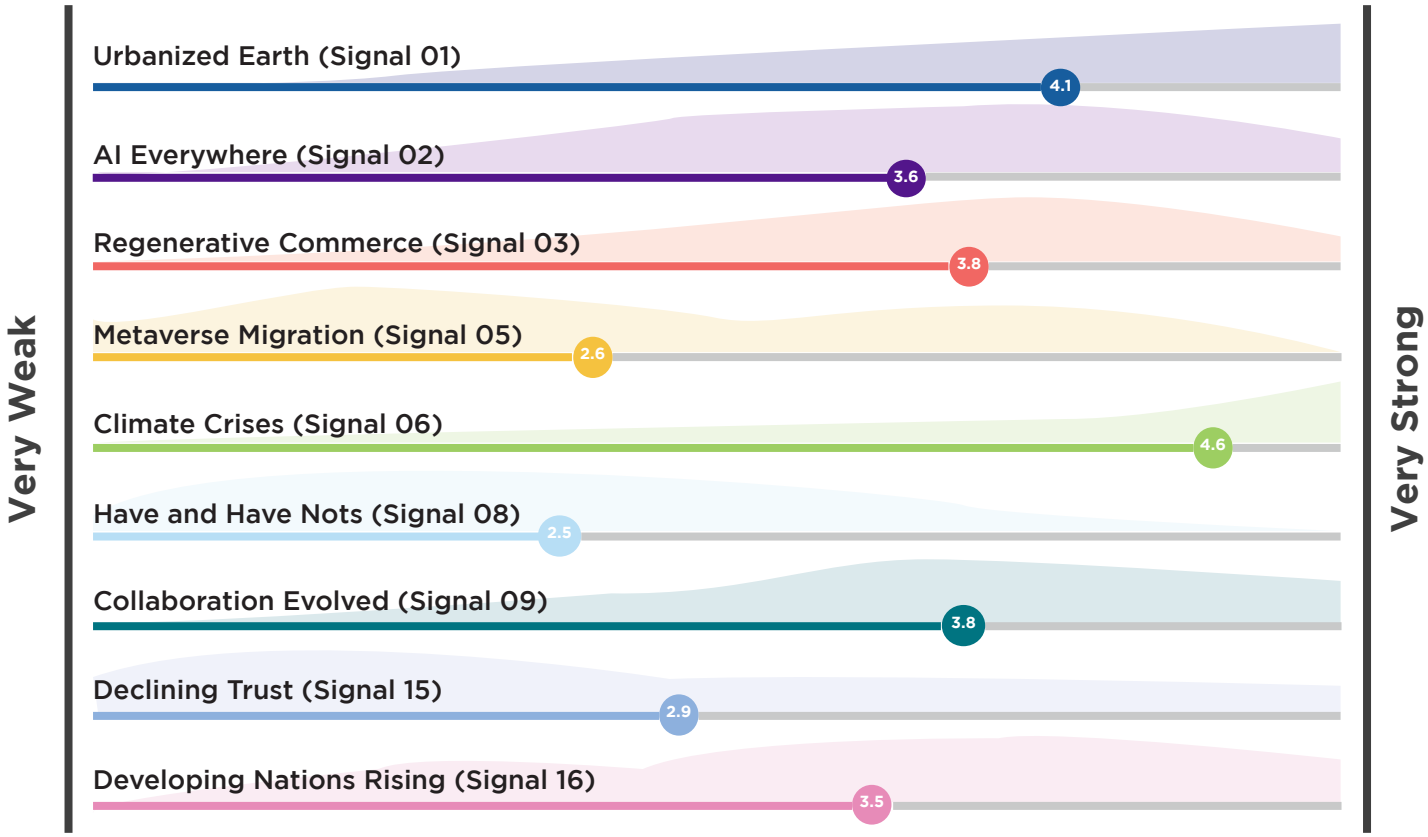
Below are some notes that give more insight into the results of the vote, and help to unpack some of the reflections that FuturesLab participants shared throughout the plenary discussion:

- **Climate Crises was judged as the most likely Signal to have significant impact on the future of human society, with 90% rating it as likely or very likely to be significant.** However, participants were roughly split into thirds on whether it would reach its peak impact in the near, mid, or long-term.

- **Urbanized Earth split participants regarding its significance, with 30% rating it as very unlikely, unlikely, or somewhat unlikely to be significant**. Some felt that the Western world had passed peak urbanism and was entering a phase of resettlement into suburbs and exurbs. Others noted that cities in developing nations would continue to grow, and may act as hubs for a globally mobile workforce.

- Signals that described tools and movements that might help address the challenges that lay before us—like Collaboration Evolved, Regenerative Commerce, and Metaverse Migration—were seen as somewhat significant developments that might unfold over the next 10-15 years. **AI Everywhere rated much higher on significance, but was also judged to have the longest time to peak impact among all of the Signals, with 40% expecting its peak impact to be 25 years or more in the future.**

How much impact might each Signal have on the AEC Industry?



Signal Session Two Voting Results

Impact on AEC Industry

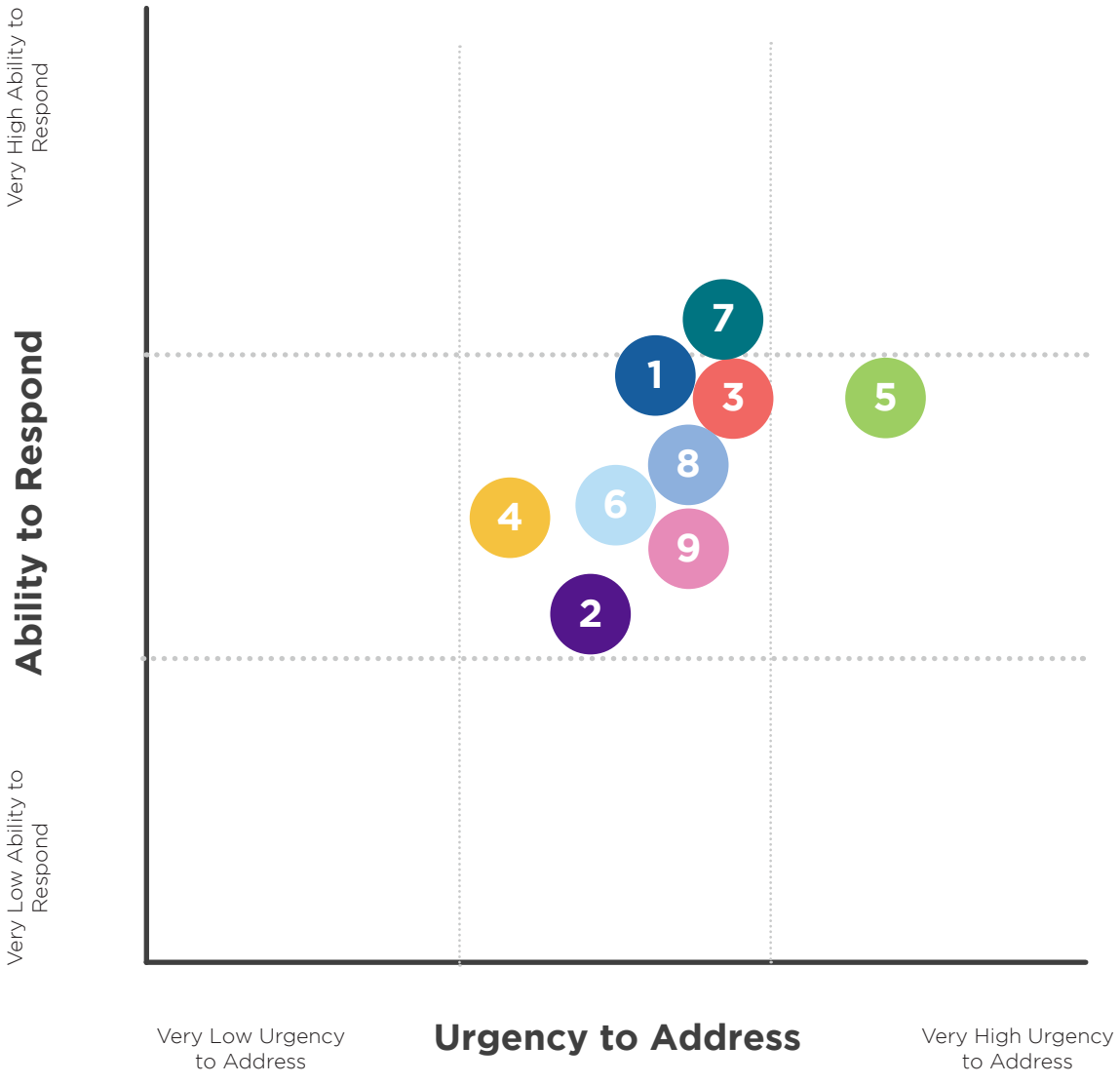
Below are some notes that give more insight into the results of the vote, and help to unpack some of the reflections that FuturesLab participants shared throughout the plenary discussion:

- By and large, participants agreed that Climate Crises will have the strongest impact on the AEC industry over the next 10 years, **with over 74% of participants voting Climate Crises as having Very Strong Impact**. The shift to urbanization characterised in Urbanized Earth was voted as the second most likely Signal to have impact on the AEC industry, although there was some disagreement as to how this impact would play out.

- Have and Have Nots was judged to have the least impact on the AEC industry, **with over 50% of participants rating this signal as having Weak Impact or Very Weak Impact**.

- Although Metaverse Migration was ranked second to last, this signal showcased a broad discord across participants, with votes spread fairly equally across all 5 voting dimensions. This may be due to a disagreement or lack of understanding as to how this signal may impact the industry in future.

How urgent is the need for AEC to address each Signal, and what ability does the industry have to respond?



Signal Legend

1. Urbanized Earth (Signal 01)
2. AI Everywhere (Signal 02)
3. Regenerative Commerce (Signal 03)
4. Metaverse Migration (Signal 05)
5. Climate Crises (Signal 06)
6. Have and Have Nots (Signal 08)
7. Collaboration Evolved (Signal 09)
8. Declining Trust (Signal 15)
9. Developing Nations Rising (Signal 16)

Session Three Voting Results

Ability to Respond and Urgency to Address

Below are some notes that give more insight into the results of the vote, and help to unpack some of the reflections that FuturesLab participants shared throughout the plenary discussion:

- Across the board, participants agreed that **Climate Crises is the most urgent Signal for the AEC industry to respond to** with most participants ranking it as Very High. There was a varied perspective on how well the AEC industry is equipped to respond to this Signal with diverse spread across the spectrum from Very Low to Very High.

- Most participants agreed that **the AEC industry has the greatest ability to respond to Collaboration Evolved** with more than 60% of participants voting High or Very High. Almost 80% of these same participants also believe that there is High or Very High urgency for the AEC industry to respond to this Signal. It is important to note a few outliers who voted Very Low for both urgency and ability to respond, representing 8% of the participant group.

- **Urbanized Earth was met with some of the greatest range of perspectives from participants.** Although more than 50% of participants agree that the AEC industry has High or Very High ability to respond, of those participants there is very little alignment on the urgency to do so. Similarly, although 50% of all participants agree that there is High or Very High urgency to respond to an Urbanized Earth, there is no significant alignment within this group about the industry's ability to respond effectively.

17 Signals of the future were developed for FuturesLab 2021.

The following Signals of the future are presented in no particular order. Signals which were leveraged as the “Final 9” Signals evaluated during FuturesLab are identified with a grey band at their top left corner.

17 Signals of the Future

01- Urbanized Earth
02- AI Everywhere
03- Regenerative Commerce
04- Internet of Places
05- Metaverse Migration
06- Climate Crises
07- Energy Revolution
08- Haves and Have Nots
09- Collaboration Evolved
10- Polarized Positions
11- Diverse Identities
12- Greying Nations
13- World on the Move
14- Institutional Shakeups
15- Declining Trust
16- Developing Nations Rising
17- New Lifeways

17 Signals - a view of the future, now.

The following set of 17 Signals are an effort to rise above the constant flow of information that washes over us everyday in order to identify and explore critical changes happening in our world.

Each Signal is a collection of data-points—like news stories, reports, surveys, and statistics—that, taken together, point to a trend which may play a significant part in shaping the future.

These Signals were informed by over 200 trends identified through an environmental scan in the domains of culture, technology, economics, science, and politics.

This research was supplemented by twenty hours of interviews conducted with professionals in the architecture, engineering, and construction industries in which we discussed emerging trends, as well as the biggest opportunities and challenges ahead of us.

Taken together, these 17 Signals provide a broad view of change—from seismic shifts shaking our global politics and cultural landscapes to emerging technologies reshaping the places we live and work.

SIGNAL 01

URBANIZED EARTH

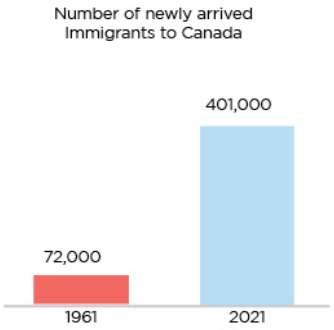
Hundreds of millions more people will settle in the world's cities in the coming decades.

What trends are converging to create this signal?

Immigration

In 1961, Canada admitted 72,000 new immigrants (<04% population increase). Current projections have Canada admitting 401,000 new immigrants in 2021 (>1% population increase).

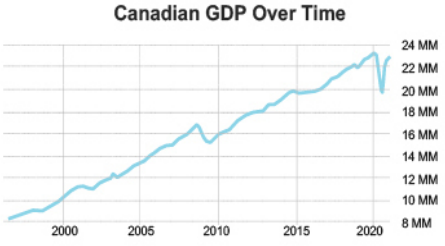
Source: Canadian Council for Refugees



Economic Growth

Canada's GDP has grown over 500% since 1975.

Source: The International Monetary Fund – Canada



Globalization

Growing Service Economy

The share of Canada's GDP tied to the service economy has increased from 58% in 1975 to over 70% today.

Source: CIA World Factbook—Canada

Gentrification

Rise of the creative class

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What is some evidence of this signal that we're seeing today?

It is predicted that by 2050 about 64% of the developing world and 86% of the developed world will be urbanized.

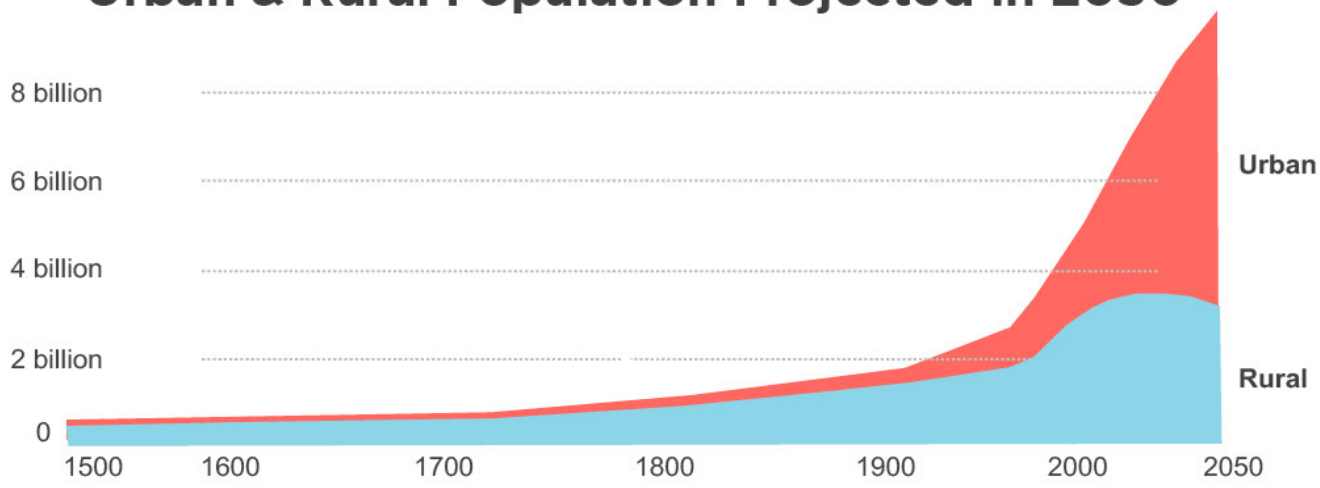
Source: The United Nations

With governor Steve Sisolak's blessing, Blockchains LLC—a company that creates cryptographic products— plans to build a crypto-enabled city in Northern Nevada that will be governed by its own charter.

Source: Bloomberg

During the pandemic, Texas state governor Greg Abbott and Miami mayor Francis Suarez made direct appeals to tech workers and high-net worth individuals fleeing dense, coastal cities and restrictive, high-tax states to set up shop in their regions.
Source: New York Times

Urban & Rural Population Projected in 2050



Adapted from: OWID based on UN World Urbanization Prospects 2018

How does all of this tie together?

The UN currently projects that 70% of the world's population will live in cites by 2050. Today, nearly 100 million people seeking opportunity and safety arrive in the world's cities every year from both surrounding rural regions and from other parts of the world. Smaller communities meanwhile, will likely shrink and age as battle as the pull of cities attracts the young and ambitious.

Urbanization might make some 21st Century problems easier to solve. For example, dense settlements with robust public transportation systems tend to emit less carbon per capita, and so urbanization likely helps to helps lower global emissions. At the same time, cities can create local environmental issues such as poor air and water quality, as well as environmental degradation that could take centuries to undue. In an era of deepening wealth inequality and political divides, global cities have also become emblems of wealth and excess.

SIGNAL 02

AI EVERYWHERE

Artificial intelligence will transform every aspect of our lives in ways both big and small.

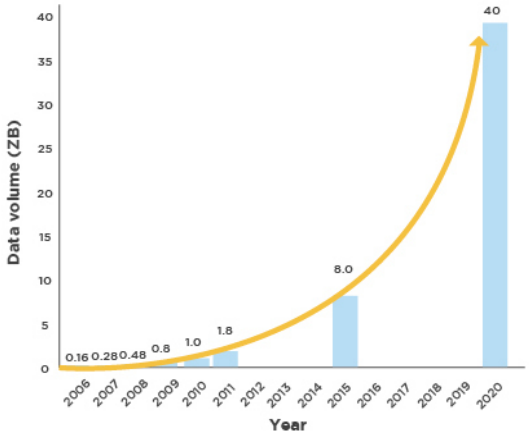
What trends are converging to create this signal?

Advancements in deep learning

Enormous amounts of data

The amount of data created over the next three years will be more than the data created over the past 30 years.

Source: IDC



Faster computer chips

Tech industry frenzy

Startup tracker Crunchbase reports there are a record number of 9,977 machine learning startups and companies in their database

Source: IDC

Cloud computing

What is some evidence of this signal that we're seeing today?

Stanford researchers call for efforts to ensure that AI technologies do not exacerbate health care disparities.

Source: Standford News

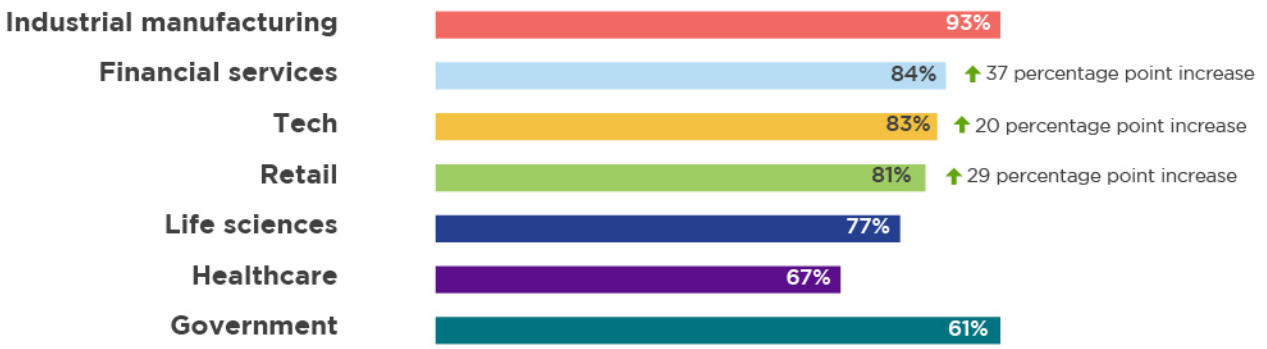
GPT-3 is an AI that used deep learning to produce human-like text. The technology is so powerful that researchers fear it can be used to automate scans and write fradulent essays, and have called for more research into risk mitigation.

Source: MIT Technology Review

Microsoft's recent acqusition of natural language processing company Nuance and their new Azure tool for building chatbots for patient interactions suggest they are preparing for a future in which AI plays a key role in healthcare.

Source: TechCrunch

Rate of AI adoption skyrocketed during COVID-19



Adapted from: KPMG

How does all of this tie together?

Today, AI (artificial intelligence) impacts everything from the way we shop to the way we work. It consumes our personal data and digital behavior to understand our tastes and beliefs. It processes speech, translates languages, spots people in crowds, diagnoses diseases, and whips people at games from Chess and Go to complex computer games. Though today AI is used for very narrow and defined tasks, some theorists and technologists believe we are on the road to creating AIs that are broad and flexible—and which may be far smarter than their human creators. We are only beginning to grapple with the ethical challenges of AI. Will AIs replace vast swaths of the human workforce? Do they encode biases that distort our social world? And do they erode our ability to make decisions? One this is certain: the challenges of artificial intelligence will be writ large across society for decades to come.

SIGNAL 03

REGENERATIVE COMMERCE

Driven by customers, regulators, and their sense of purpose, the business community will continue to adopt sustainable, regenerative, and equitable practices.

What trends are converging to create this signal?

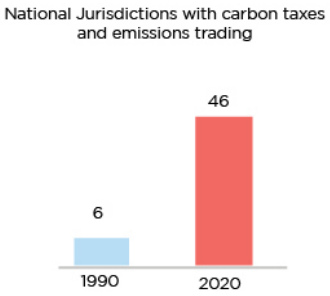
Conscious consumerism

Triple bottom line accounting

Carbon taxes and emissions trading

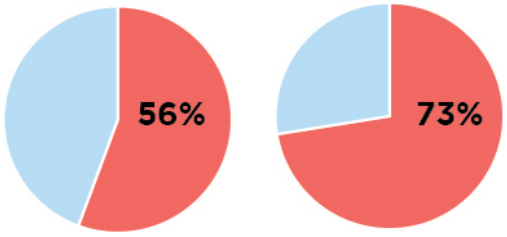
6 national jurisdictions in 1990 vs. 46 national jurisdictions in 2020.

Source: The World Bank



Social procurement

Public mistrust of institutions



56% of people believe capitalism today does more harm than good, while 73% believe that business can both make proft and at the same time improve its communities.

Source: Edelman Trust Barometer

Climate Change activism

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What is some evidence of this signal that we're seeing today?

Elon Musk establishes a $100 million dollar innovation prize for carbon capture technology.

Source: xprize

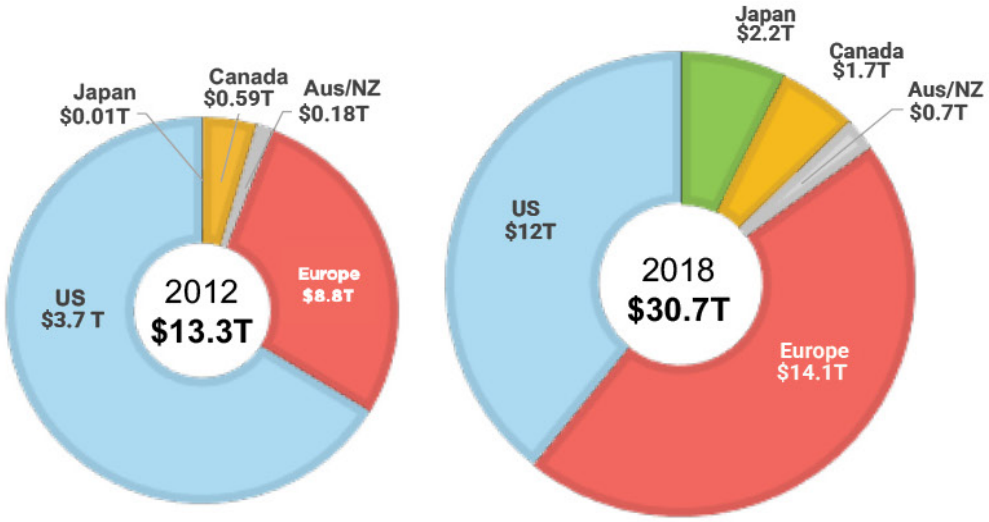
Walmart pledges zero emissions by 2040.

Source: Walmart

2000 CEOs from 85 industries sign the Action on Diversity and Inclusion to improve representation in their workforces.

Source: Edelman Trust Barometer

Global Growth in Sustainable Investments (USD$ Trillion)



Source: Global Sustainable Investment Alliance, 2018

How does all of this tie together?

Beyond fulfilling their fiduciary responsibility to return profits to shareholders, businesses are held to increasingly high standards by all of their stakeholder groups—including customers seeking products or services, employees vetting potential employers, and governments seeking vendors or partners.

Arguably, the push toward stakeholder capitalism is being driven in part by the increased scrutiny on businesses through the rise of social media and citizen journalism. At the same time, there is a growing recognition among business leaders that "the right thing" for people and planet is also good for the bottom line. The most forward-looking businesses today are beginning to pursue "regenerative" practices that do not simply seek to minimize externalities but to provide a net environmental and social benefit.

SIGNAL 04

INTERNET OF PLACES

Our cities' buildings, streets, and infrastructure will be hyper-connected through technology and data analytics.

What trends are converging to create this signal?

Internet of Things

Forecasts suggest that by 2030 around 50 billion IoT devices will be in use around the world, creating a web of devices spanning everything from smartphones to kitchen appliances and street lights.

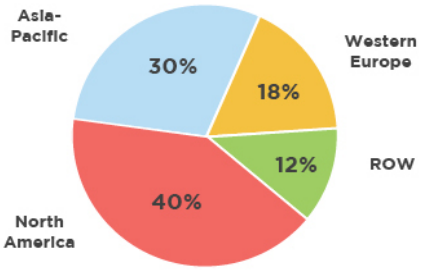
Source: Statista

Big data

Smart homes

There are an estimated 175 million smart homes worldwide.

Source: Comfy Living



Supply chain modernization

Aging infrastructure

Governance innovation

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What is some evidence of this signal that we're seeing today?

The Colonial Pipeline Hack underscored key vulnerabilities in the US' cybersecurity.

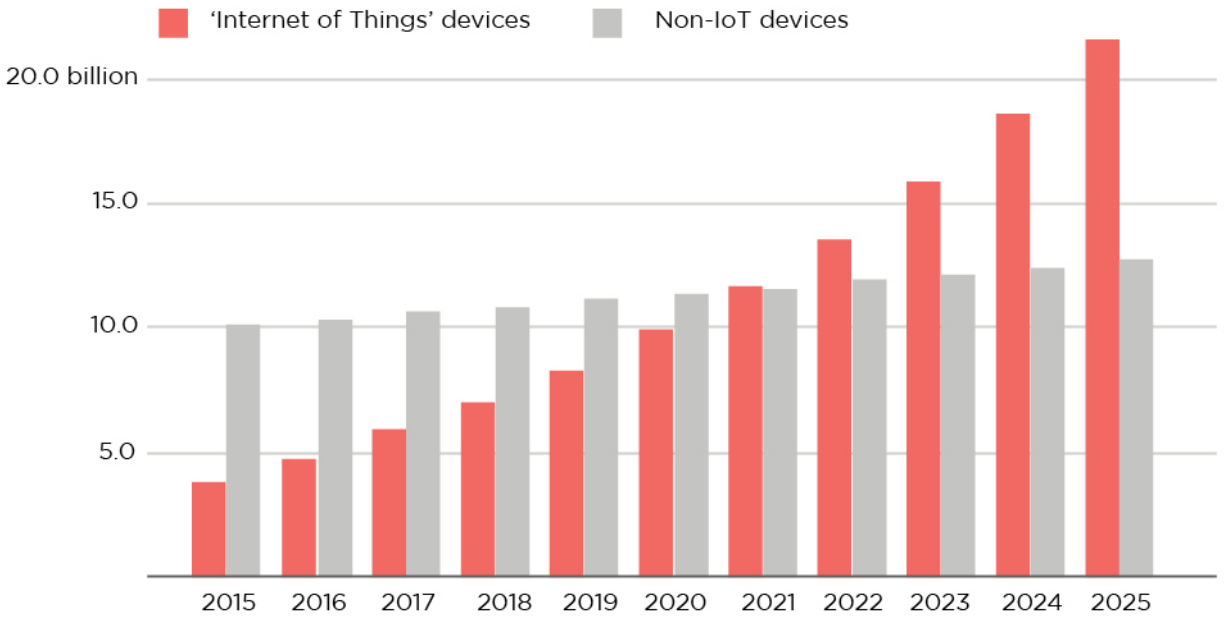
Source: New York Times

The Polish city of Olsztyn is using an Ethereum smart contract to run its emergency services.

Source: be IN crypto

Sidewalk Labs ended its partnership with Waterfront Toronto to redevelop the Quayside region after sustained public criticism surrounding its processes.
Source: The Globe and Mail

Number of internet-connected devices growing rapidly



Adapted from: Phys Org

How does all of this tie together?

The internet-connect devices trend which began in the consumer electronics space is findings its way into municipal infrastructures and services - roads, traffic, safety, and buildings. Smart cities of the future will be hyper-connected hubs of data and technology. Citizen-powered smart technologies, such as resident noise and air pollution monitoring kits, may shift power to residents and support globally collaborative data networks.

At the same time, citizen groups have raised concerns about how smart city initiatives will maintain safe data-handling practices, address privacy issues, and avoid worsening inequities by surveilling vulnerable groups and community policing.

SIGNAL 05

METAVERSE MIGRATION

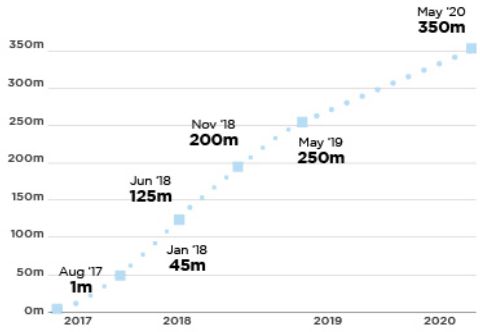
Our digital and physical worlds will blend, making the distinction increasingly irrelevant.

What trends are converging to create this signal?

Digital goods

Since it's launch, Fortnite has sold over $1 billion of in-game goods—mostly cosmetic "skins", emotes, and dances—to players.

Source: Investopedia



High-speed Internet

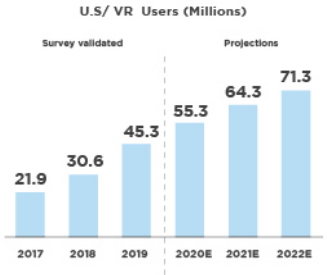
Creator economy

Last year, Roblox paid out at least $10,000 to 1250 of its in-game creators, and $100,000 to its top 300 creators based on player engagement with their experiences

Source: Tech Crunch

Rise of video game market

VR/AR adoption



Source: VR/AR Association

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What is some evidence of this signal that we're seeing today?

Facebook's Horizon VR project aims to popularize the use of virtual reality for social occasions, such as work meetings, artistic performances, and remote get-togethers.

Source: CNET

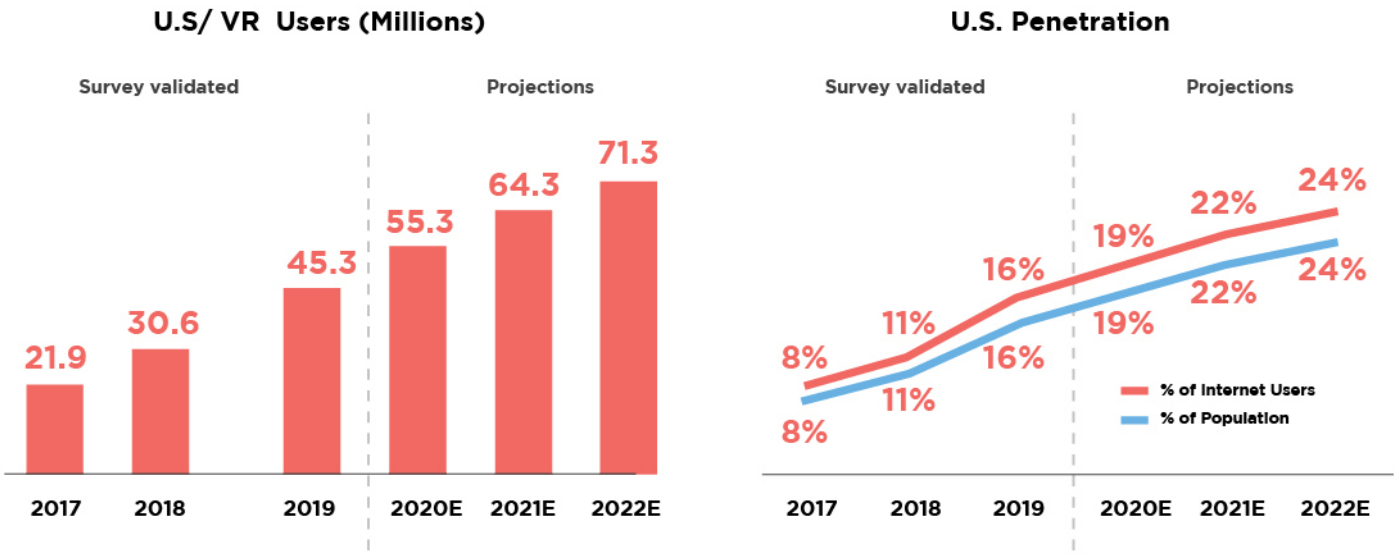
Naoz is a persistent digital entertainment venue developed by the Belgian electronic dance music festival Tomorrowland where attendees appear as virtual avatars and can socialize and dance to live music together.

Source: NAOZ

Decentraland is a blockchain-based virtual world in which users buy digital real estate. Already, Decentraland has seen $50 million in sales, including land, avatars, and virtual outfits.

Source: Reuters

U.S. VR Users 2017 – 2022



Adapted from: VR/AR Association

How does all of this tie together?

Next-generation digital technologies—like AR/VR, highly realistic game engines, haptics and wearables, IoT, big data, and artificial intelligence—could transform today's Internet into a persistent, integrated digital world in which each person has a parallel digital life.

The so-called Metaverse will be a place where people socialize, play, shop, attend experiences, and do just about anything else they do in the physical world. Some may choose to disappear into the Metaverse altogether—a possibility which raises moral and ethical questions that go to the heart of what it means to be human.

SIGNAL 06

CLIMATE CRISES

Climate change will have increasingly clear and dire impacts on our environment.

What trends are converging to create this signal?

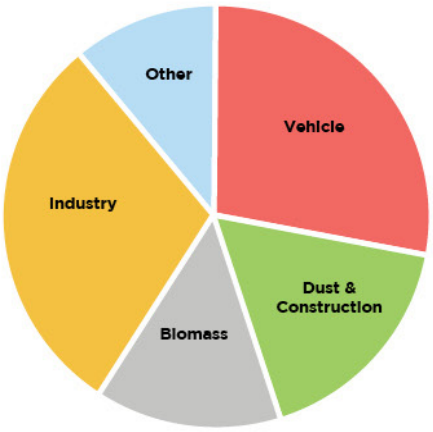
Heavy industry

Agriculture, land use, and forestry

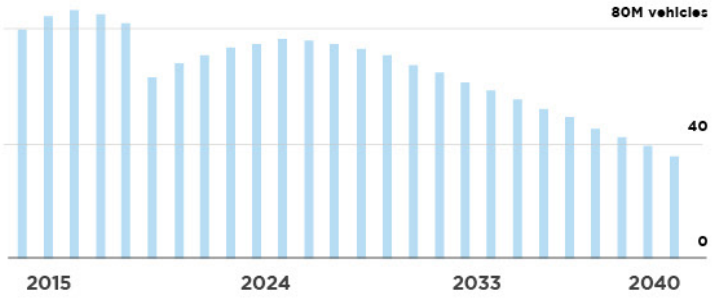
Non-renewable energy sector

Failing and inadequate infrastructure

Contributors to Global Emissions by Source



Gas-powered vehicles



In a market broadsided by the pandemic, global sales of gas-powered cars and trucks may have already peaked.

Source: Bloomberg NEF

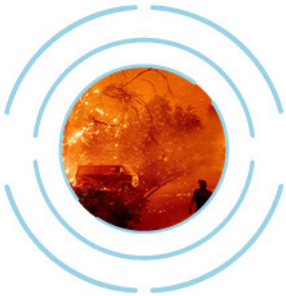
What is some evidence of this signal that we're seeing today?

Globally, 1.5 billion people live in cities that are at high risk from pollution, water shortages, extreme heat, and natural hazards.

Source: Bloomberg

Younger generations (Gen Z, Millennials) are more active in the fight against climate change, with worldwide protests in 2019 led by then 16 year old Greta Thunberg.

Source: Pew Research Center

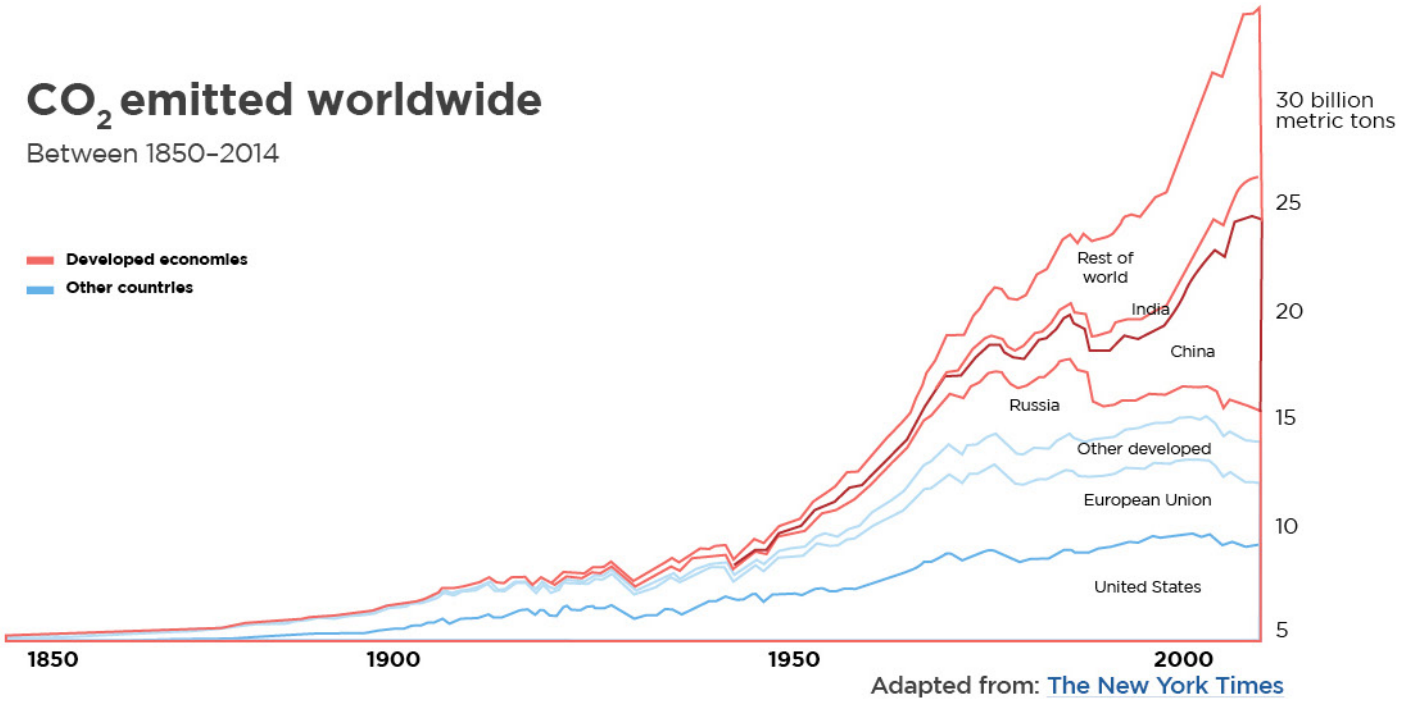


A new report from the EPA outlines climate change's everyday impact on Americans—from worsening allergy seasons to more destructive floods and wildfire seasons.

Source: New York Times

CO_2 emitted worldwide

Between 1850–2014



Adapted from: The New York Times

How does all of this tie together?

From destructive wildfires in Australia and California to crop-eradicating droughts in the Canadian prairies and deadly heatwaves in Southern Europe and India, the impacts of climate change are being felt all over the world. While wealthy countries move to curb their carbon emissions and urge others to do the same, they face accusations that they are pulling up the ladder of economic development behind them, consigning billions to poverty and immiseration.

As the world's countries inch toward establishing international standards and agreements, a new generation of climate activists like Fridays for Future and Extinction Rebellion demand urgency and seek to compel action through protest.

SIGNAL 07

ENERGY REVOLUTION

Renewable, clean, and sustainable energy sources will end our global reliance on non-renewables.

What trends are converging to create this signal?

Falling cost of solar

The operating costs of solar arrays are projected to fall below non-renewables by 2030.

Source: Rameznamm.com

Government subsidies for clean energy

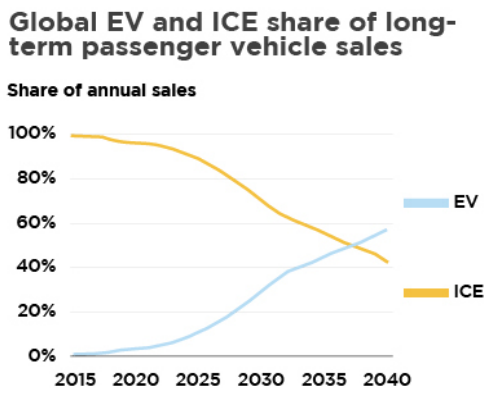
Green consumerism

Decarbonization

Electric vehicles

There were 11 million registered electric vehicles at the end of 2020, and that number is projected to rise to to between 150 and 250 million by 2030.

Source: World Economic Forum



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What is some evidence of this signal that we're seeing today?

Globally, 260 gigawatts (GW) of renewable energy capacity were added in 2020, exceeding expansion in 2019 by close to 50%.

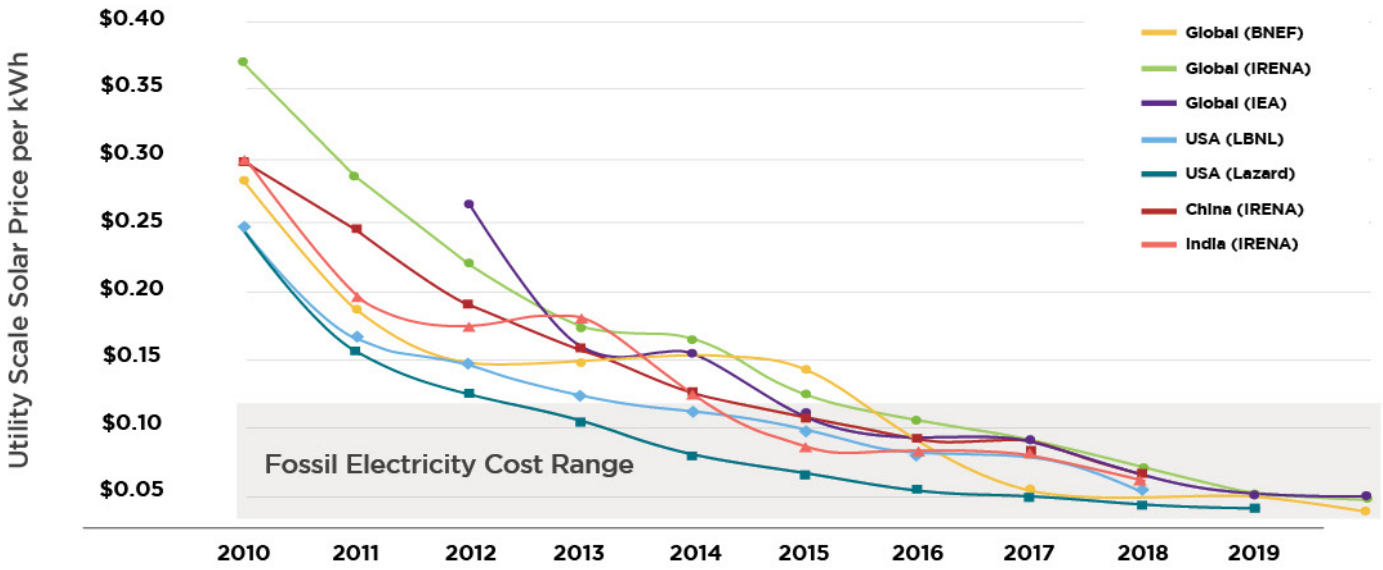
Source: World Economic Forum

Swimming pools, car parks, depots and community buildings in the Southern Australia capital of Adelaide are now powered entirely by renewable energy.

Source: The Conversation

This past April, Britain's electricity grid reached the greenest it's ever been, with zero-carbon power sources including wind, solar and nuclear making up 80% of the energy mix.
Source: The Guardian

Solar Costs Dropped by a Factor of 5 Since 2010



Adapted from: Rameznamm.com

How does all of this tie together?

As a result of effective government subsidies and steady innovation, manufacturing, and efficiency improvements, clean and renewable energy sources like solar, wind, and hydrogen are now poised to compete at par in global energy markets with non-renewables like oil and gas. While it will take time for legacy non-renewable energy players to pivot their businesses, many of the biggest players in energy have been preparing for a post-carbon economy for decades. But "choosing green" may initially be a luxury for those who can afford it. Others—whether individuals, companies, or even countries—may find themselves saddled with assets and infrastructure that are not well suited for the new world of green energy.

Ever increasing climate emergencies continue to challenge traditional energy models, increasing support for self-sustaining community micro-grid hubs and alternative forms of renewables, such as green hydrogen.

SIGNAL 08

HAVES AND HAVE NOTS

The gap between the world's wealthiest individuals and everyone else will grow larger.

What trends are converging to create this signal?

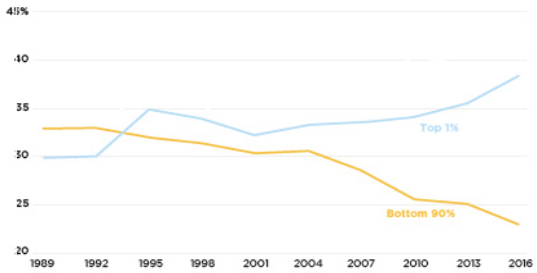
Wealth concentration

70% of the net wealth of Americans is held by the top 10% of people.

Source: Statista

The wealthiest Americans own an increasing share of wealth

Shares of wealth in the United States by wealth percentiles, 1989–2016



Globalization

Wage stagnation

Rising health, education, and housing costs

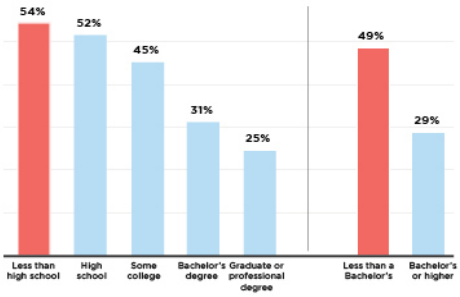
Automation

55% of the jobs that don't require a bachelor's degree are in jeopardy of automation.

Source: What to Become

Non-college workers will see greater job change from automation

Average automation potential by worker education attainment, 2016



Source: Brookings Analysis of 2016 American Community Survey 1-Year microdata

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What is some evidence of this signal that we're seeing today?

While high-wage jobs have returned to pre-pandemic levels, jobs for the lowest-paid workers—those earning less than $27,000 per year—are still 30% below their pre-pandemic level.
Source: Forbes

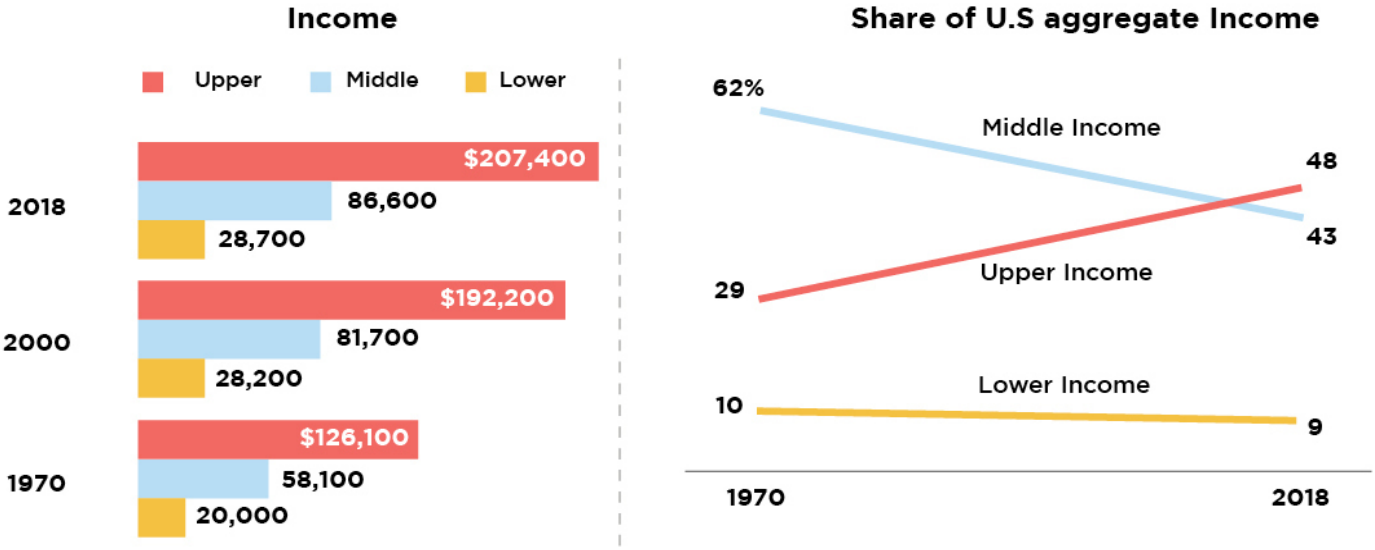
President Joe Biden could cancel up to $50,000 in student loan debt for all borrowers and may use executive action to make this happen.

Source: Forbes

The OECD is calling for a wealth tax and the closing of avoidance loopholes after the pandemic to combat rising wealth inequality.

Source: The Guardian

Median household income, in 2018 dollars, and share of U.S aggregate household income, by income tier



Adapted from: Pew Research Center

How does all of this tie together?

While the number of people living in extreme poverty has drastically decreased over the last half-century, the same period saw the rich further accumulate enormous wealth while the majority of people experienced little growth in their earnings or net worth.

Today, levels of wealth inequality in many nations are as high as they were during the so-called "Gilded Age" of the late 19th century when industrialists like Andrew Carnegie amassed fortunes while the masses were immiserated in factory jobs and menial labor. And as in that period, pressure is mounting on governments to intervene through wealth and inheritance taxes that would fund large-scale public works, social programs, and redistributive programs to balance the scales.

SIGNAL 09

COLLABORATION EVOLVED

New tools and process will flatten organizations, creating shared responsibility and purpose.

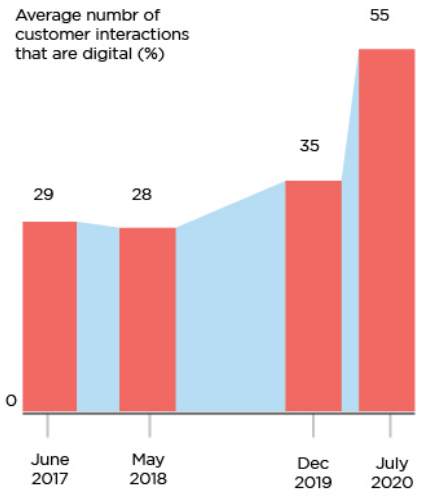
What trends are converging to create this signal?

Embrace of startup culture

Digital work tools

COVID-19 has accelerated the global adoption of digital tools by 7 years ahead of the average rate of adoption from 2017 to 2019.

Source: McKinsey



Culture-driven work environments

Design thinking

Adoption of Lean and Agile

81% of respondents from a recent KMPG survey started their Agile transformation within the last 3 years.

Source: KPMG

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What is some evidence of this signal that we're seeing today?

Counting both free and paying users, Zoom has 300 million daily meeting participants. That's an increase of 2900% since December 31, 2019, when 10 million daily meeting participants logged on.

Source: Backlinko

2000 CEOs have signed the Action for Diversity & Inclusion pledge. The pledge requires signatories like 3M, Netflix, PepsiCo, and hundreds of others to publicly state their actions taken toward improving D&I.

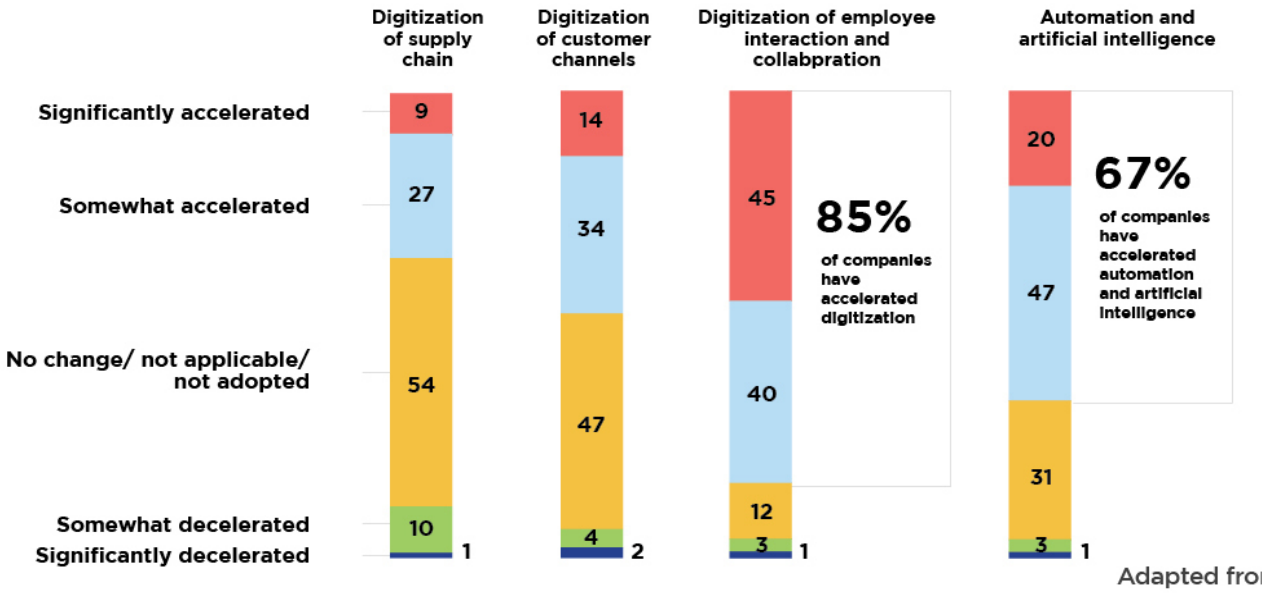
Source: Ceo Action

Low-code development—which allows non-technical users to builds apps using a set of basic functional code "building blocks"—has unleashed an explosion of problem-solving creativity.

Source: Forbes

Since the start of the COVID-19 outbreak, how has your company's or business area's adoption of the following technology trends changed?

% of respondents (n=800)



Adapted from: McKinsey

How does all of this tie together?

The days of centralized decision-making and command-and-control organizational structures are behind us. Today, new processes and tools as well as broad recognition of the value of diversity and the need for mutual trust, understanding, and shared purpose have led to organizations with structures that resemble networks rather than hierarchies.

As the digital tools used in collaborations become more sophisticated, we should expect that teams will find ever more creative ways to determine how they work together.

SIGNAL 10

POLARIZED POSITIONS

People will retreat into informational bubbles created by both old and new media, leading to deepening social and political schisms.

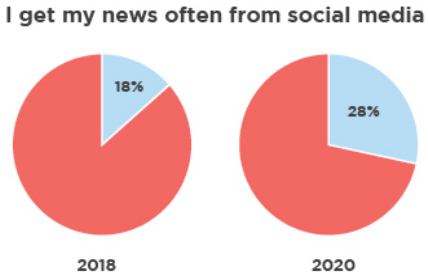
What trends are converging to create this signal?

Extremizing algorithms

Social media

The share of Americans who often get their news from social media grew 10 percentage points to 28% in 2020.

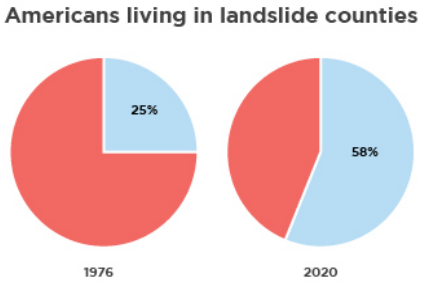
Source: Pew Research Center



The Big Sort

In 1976, a quarter of the US lived in landslide counties, carried by one party or the other by 20 points or more. In November 2020, the number was 58%.

Source: Governing



Blurring of the personal and political

Rise of partisan media

What is some evidence of this signal that we're seeing today?

Willingness to receive a vaccine and actual vaccination rates to date are lower in counties where a majority of residents voted to re-elect former President Donald Trump in 2020.

Source: NY Times

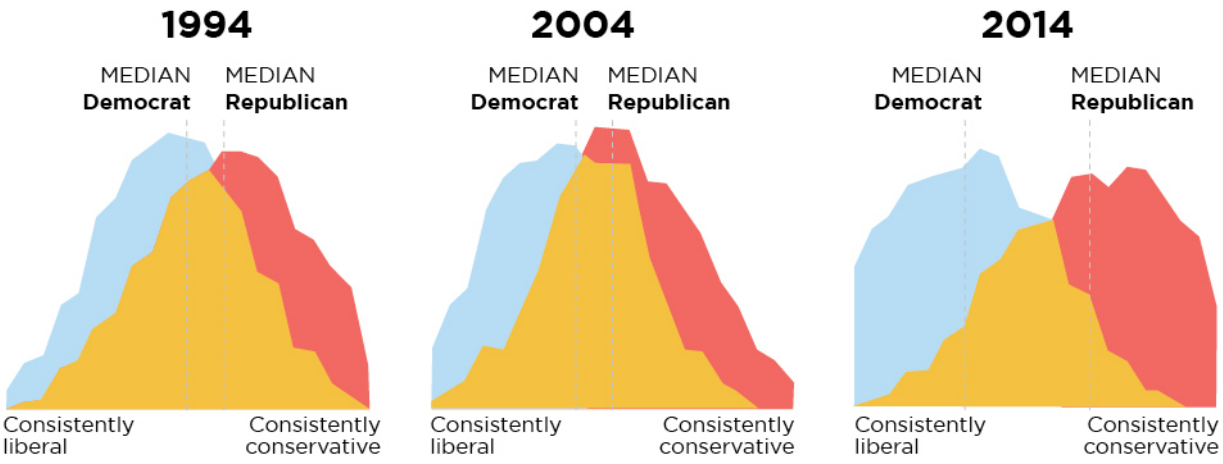
China's Great Firewall sanitizes and censors both domestic and foreign media critical of the state.

Source: Human Rights Watch

Videos posted to social media platforms like TikTok and Twitter have played a significant role in fanning the flames of the Israel-Palestine conflict.

Source: BBC

Distribution of Democrats and Republicans on a 10-item scale of political values



Adapted from: PEW Research Center

How does all of this tie together?

In the mid-20th century, Americans complained that the Republican and Democratic parties were too similar to one another. Today, political polarization in both party platforms and people's beliefs have created enormous rifts in society. Individuals with different political beliefs are far less likely to rub shoulders with one another. They live in different parts of the country, work different jobs, and enjoy different hobbies. As we retreat into our digital enclaves and the social glue of shared institutions continues to wear away, we may eventually create a world in which the lines between ideologies are as hardened as those that divide warring tribes.

SIGNAL 11

DIVERSE IDENTITIES

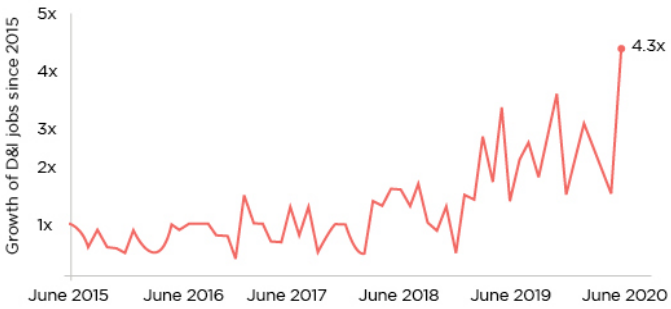
We will have greater knowledge, recognition and allowance for individual identities and experiences.

What trends are converging to create this signal?

Corporate diversity commitments

Job posts for diversity roles

LinkedIn monthly job posts for diversity and inclusion (D&I) roles, indexed to June 2015.



Media Representation

Diversifying workforces

40 percent of GDP growth in the US economy between 1960 and 2010 can be attributed to greater participation of women and people of color in the labor force.

Source: Forbes

Multiculturalism

Civil rights and social justice movements

What is some evidence of this signal that we're seeing today?

Georgia-based brands like Coca Cola and Delta condemed the state's proposed voting laws, which would discriminate against Black Americans. The MLB relocated its All-Star Game from Atlanta to Colorado.

Source: NPR

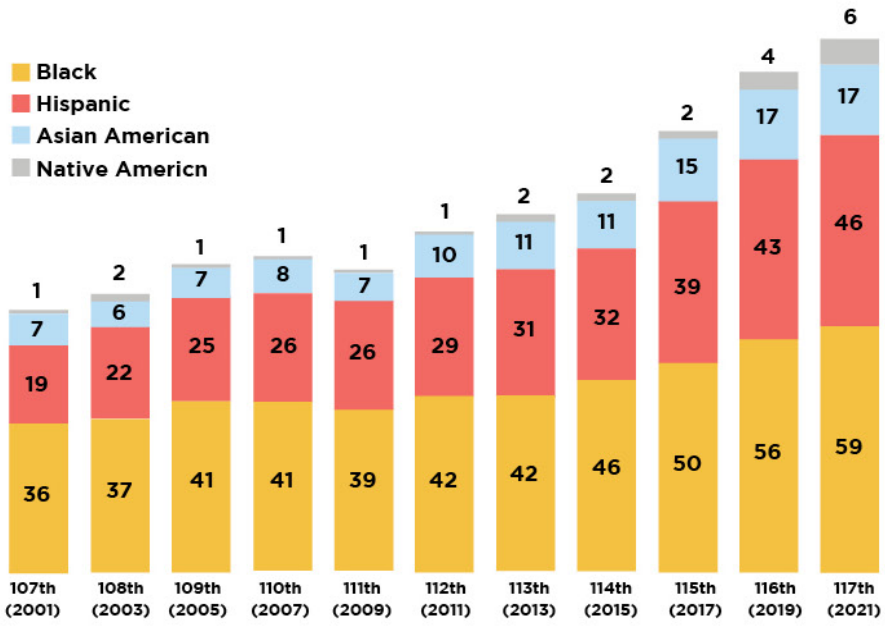
The US Senate passed a bill with broad bi-partisan support to address the rise in anti-Asian hate crimes in the wake of the Coronavirus pandemic.

Source: NY Times

Instagram therapy providers are breaking down barriers to mental health care and creating visibility for mental health issues.

Source: Toronto Star

Number of non-White House and Senate members by race/ethnicity



Adapted from:
PEW Research Center

How does all of this tie together?

In every walk of life—from work to governance, sports to media—organizations are being held to account for how they've failed to reflect the diversity of the broader societies in which they exist. As a result, they're increasingly looking inward to examine how their internal cultures and practices might actively discourage diversity and inclusion.

While some are resistant to change, there is at the same time a growing awareness of the many benefits of nurturing diversity and inclusion within organizations. Creating welcome and inclusive environments can help develop trust, improve productivity and morale, and promote creativity and problem-solving from different perspectives.

SIGNAL 12

GREYING NATIONS

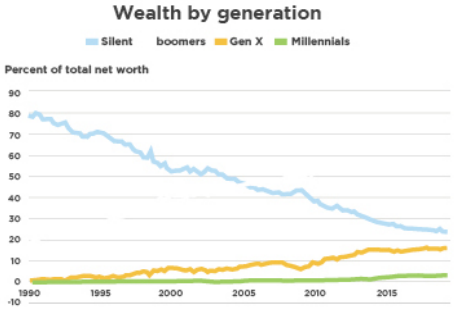
People will live longer and birth rates will continue their half-century decline in developed countries.

What trends are converging to create this signal?

- Low birth rates
- Changing labor forces
- Restrictive Immigration
- Low Millennial share of wealth

Despite making up the largest portion of the workforce, millennials control just 4.6% of U.S. wealth.

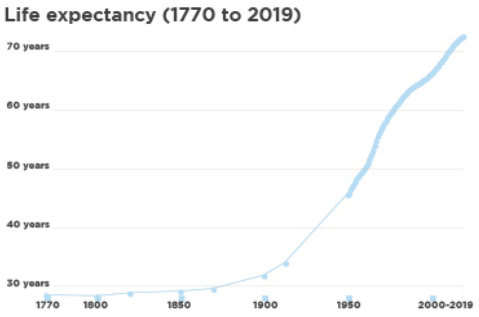
Source: Federal Reserves



- Increased lifespans

The UN estimates a global average life expectancy of 72.6 years—an average higher than in any country back in 1950.

Source: Our World in Data



- Advances in medical science

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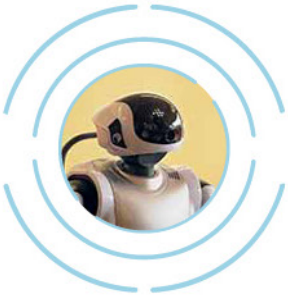
What is some evidence of this signal that we're seeing today?



The market for care robots will reach $3.7 billion in Japan by 2035. Rather than invite foreign nurses and personal care workers to the country, they're creating robots to manage elder care.

Source: Financial Times

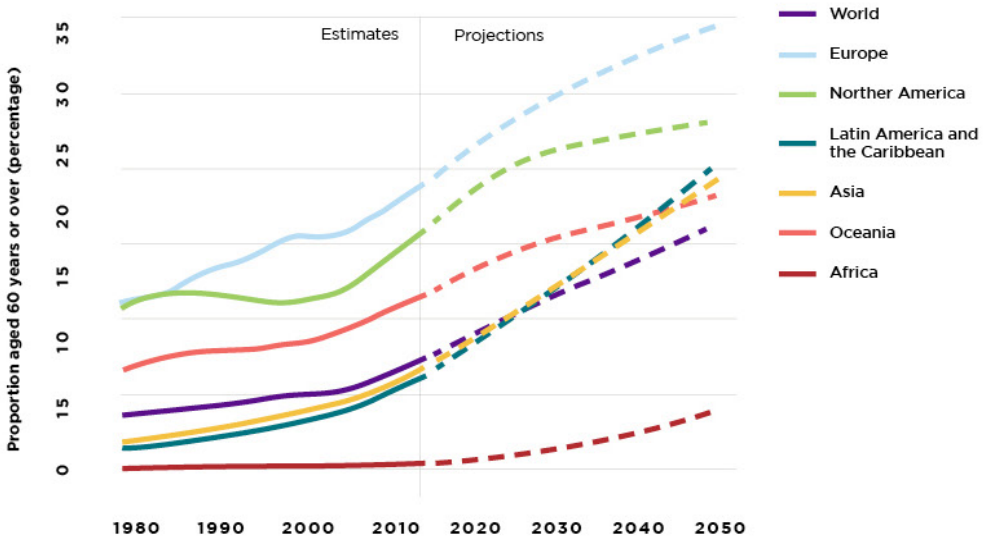
Recent census data has revealed that the US is well below replacement fertility rates. China, too, is rapidly aging—a legacy of the one-child policy.

Source: Japan Today

Cellular Longevity is developing treatments that extend the life span of dogs. If successful, the company expects consumers and regulators will be more favorably disposed to similar treatments for humans.

Source: Bloomberg

Percentage of population aged 60 years or over by region, from 1980 to 2050



Adapted from: United Nations

How does all of this tie together?

In the long run of human history, the average human lifespan was not especially long. In the last 200 years, due to advances in sanitation, medicine, and safety, people are living twice as long. At the same time, over the last fifty years, birth rates in many parts of the world have been on a steady decline. Today, countries like Japan and the US are well below the replacement average rate of 2.1 children required to sustain population size.

Unless aging countries adopt comprehensive pro-child policies and drastically increase the number of newcomers invited to the country, they face a future in which a growing number of retirees and elderly dependants are supporting by an increasingly thread-bare and tax-burdened workforce.

SIGNAL 13

WORLD ON THE MOVE

Seeking opportunities and fleeing climate and political crises, more people than ever will migrate from their countries of birth.

What trends are converging to create this signal?

Economic migration

There are an estimated 272 million international migrants—most of them seeking economic opportunity—around the world.

Source: World Economic Forum

War, conflict, and government persecution

Expanded immigration targets

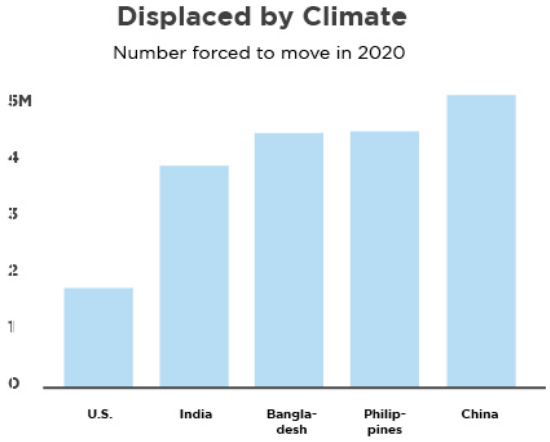
Skilled labor shortages

Globalized workforces

Climate displacement

About 10.3 million people—most of them in Asia—were displaced by climate change-induced events such as flooding and droughts.

Source: Reuters



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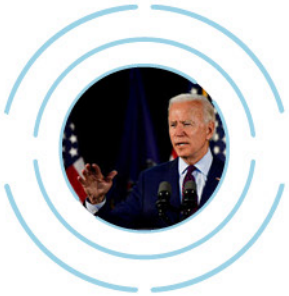


After a period of restriction during the Trump presidency, the H1-B visa program has been expanded to invite 65,000 foreign workers—most of whom are Indian IT professionals—to three-year renwable work visas in the US.

Source: Economic Times

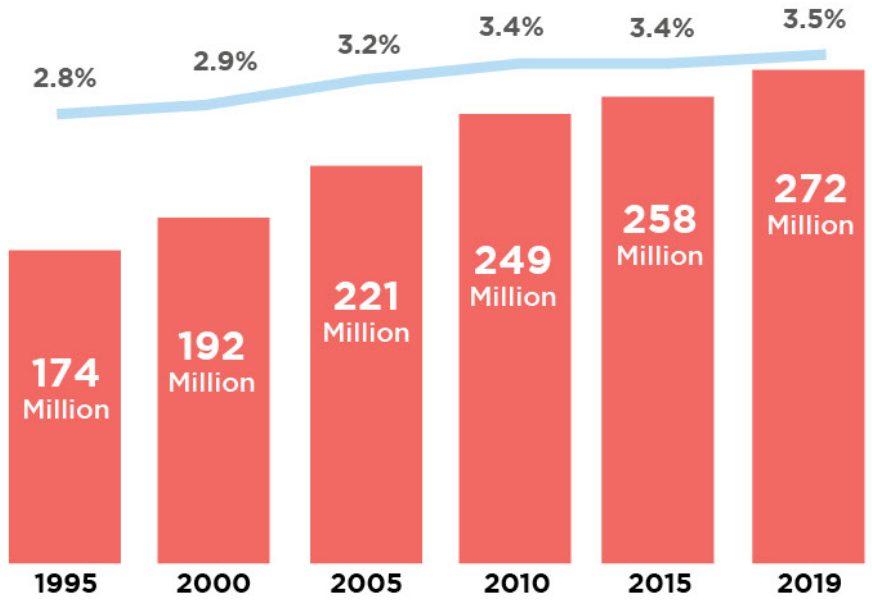
Since it was first introduced into law more than 40 years ago, private sponsors have helped resettle over 300,000 refugees in Canada. Two million Canadians report that they personally helped Syrian refugees resettle in Canada.

Source: The Conversation

Far-right anti-immigrant parties are making headway in European parliaments and elections.

Source: NY Times

Snapshot of international migrants



Adapted from: World Economic Forum

How does all of this tie together?

Today, nearly 5% of people in the world live in a country other than the one in which they were born. The vast majority leave their home countries seeking economic opportunities and settle in global economic hotspots like the US, UK, and UAE, while a comparatively small number are driven from their countries by conflict and crises—although there are good geopolitical and environmental reasons to believe that their relative numbers may increase.

Human migration stokes fear and anxiety in destination countries surrounding migrants' impact on people's economic opportunities and the existing culture. Some politicians are willing to cultivate this unease for political gain and have succeeded in curtailing immigration—at least for the time being. It seems certain that immigration will be a defining issue of the 21st century.

SIGNAL 14

INSTITUTIONAL SHAKEUPS

Key societal institutions will be transformed by waves of social and technological change.

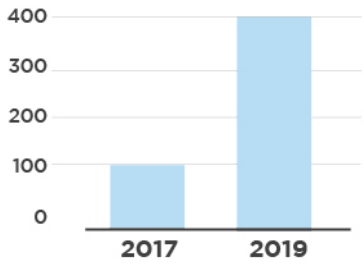
What trends are converging to create this signal?

Social and economic inequality

Social media organizing

Facebook says there are more than 400 million people in groups that they find meaningful as of April 2019, up from 100 million in February 2017.

Source: CNBC

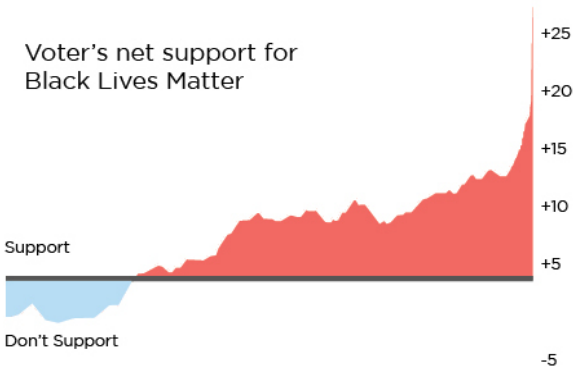


Cryptography

Protest movements

The Black Lives Matter protests peaked on June 6, when half a million people turned out in nearly 550 places across the United States.

Source: NY Times



What is some evidence of this signal that we're seeing today?

The r/WallStreetBets phenomenon pit retail investors against enormous hedgefunds in a fight to determine the future of trading.

Source: Esquire

Protests in the wake of the killing of George Floyd have led many cities to commit to expansive police reforms.

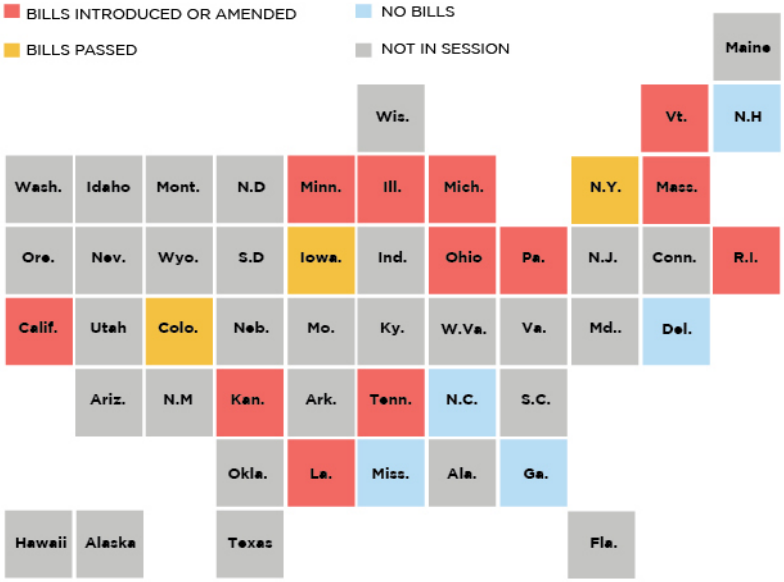
Source: Independent

Cryptocurrencies like Bitcoin, Ethereum, and Dogecoin are on the rise, challenging the role of traditional flat currencies.

Source: Financial Post

Many states are revisiting their policing strategies

New policing bills in the three weeks following George Floyd's death



Adapted from: Five Thirty Eight

How does all of this tie together?

The past several decades have demonstrated how key institutions may not be well equipped for 21st-century challenges. From the failures of US intelligence agencies in the lead-up to the Iraq War to the role of banks in the 2008 global financial crash and the scrutiny placed on law enforcement due to racial disparities in policing, the signs of institutional disorder appear everywhere.

A new generation of activists is demanding change by exerting direct pressure on politicians and policymakers to force reform on offending institutions. At the same time, hackers and technologists are building the backbone for an entirely new set of institutions that can exist apart from the mainstream.

SIGNAL 15

DECLINING TRUST

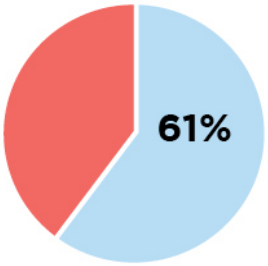
Trust is in short supply—not only toward media, government, and corporations, but even one another.

What trends are converging to create this signal?

Poor institutional performance

61% of Americans believe that the fundamental "design and structure" of American government needs "significant changes" to address the country's challenges.

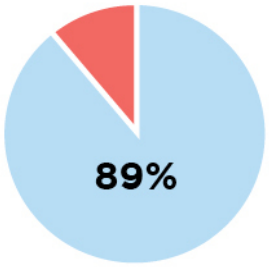
Source: Pew Research Center



Media bias

89% of Americans cited "inaccurate or misleading reporting, lies, alternative facts or fake news" or "biased, slanted or unfair reporting" as the reason for declining trust in news.

Source: Knight Foundation



Government gridlock

Decline of civic society

Perceived unfairness

What is some evidence of this signal that we're seeing today?

The inability for states to properly address the pandemic has led to a collapse in citizens' reported levels of trust in the governments.

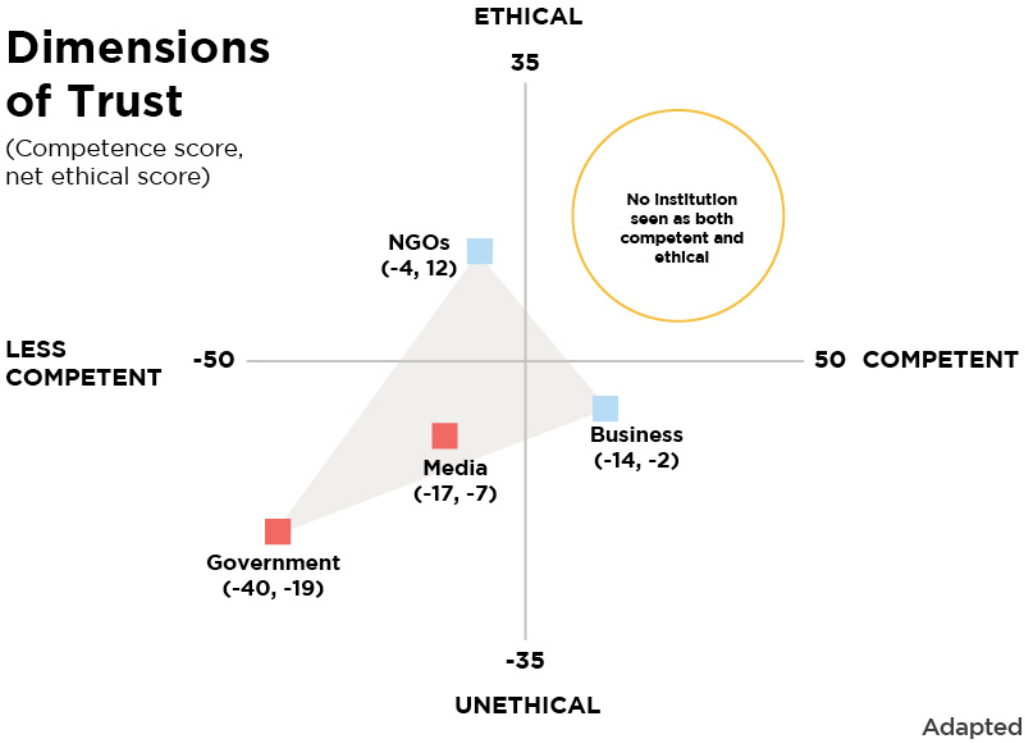
Source: Edelman

1 in 4 US adults said in June that the pandemic was definitely or probably "planned by powerful people."

Source: c&en

Liz Cheney was removed from her position as the Chair of the House Republican Conference over her unwillingness to embrace the belief that the 2020 election was stolen.

Source: The New Yorker



Adapted from: Edelman

How does all of this tie together?

Levels of trust in society have been on a decades-long slide. A culture of individualism has meant that people have fewer connections and close friends, and therefore less "social capital." More beliefs and attitudes are formed via the consumption of news and media—which have themselves collapsed into partisanship.

Governments, banks, journalists, and public health institutions have all seen the publics' levels of trust in them collapse under the weight of their institutional failures. Rebuilding trust in one another and our institutions—if it's possible—may take generations.

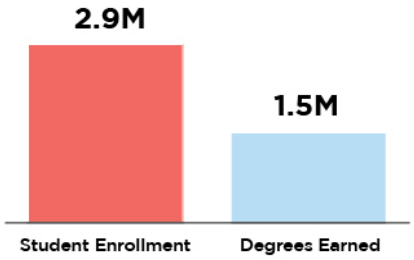
SIGNAL 16

DEVELOPING NATIONS RISING

Developing countries in Asia, Africa, and South America are poised to be major economic and geopolitical actors in the 21st century.

What trends are converging to create this signal?

- Globalization
- E-commerce and IT innovation
- Rising middle class



Emerging skills education

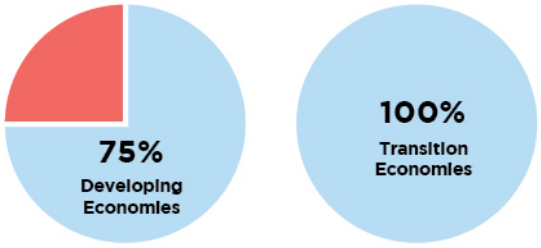
India has 6,214 engineering schools in which 2.9 million students are enrolled. Every year, on average, 1.5 million students earn an engineering degree.

Source: BW Education

- Growth of special economic zones

SEZs are used by more than 140 economies around the world, almost three quarters of developing economies and almost all transition economies.

Source: UNCTAD



What is some evidence of this signal that we're seeing today?

Shenzhen is set to invest more than 100 billion dollars in hi-tech research and development over the next five years as it seeks to reinforce its position as China's innovation powerhouse.

Source: SCMP

Prospera, a mini startup nation in Honduras with its own set of laws, begins recruiting residents amid local controversy.

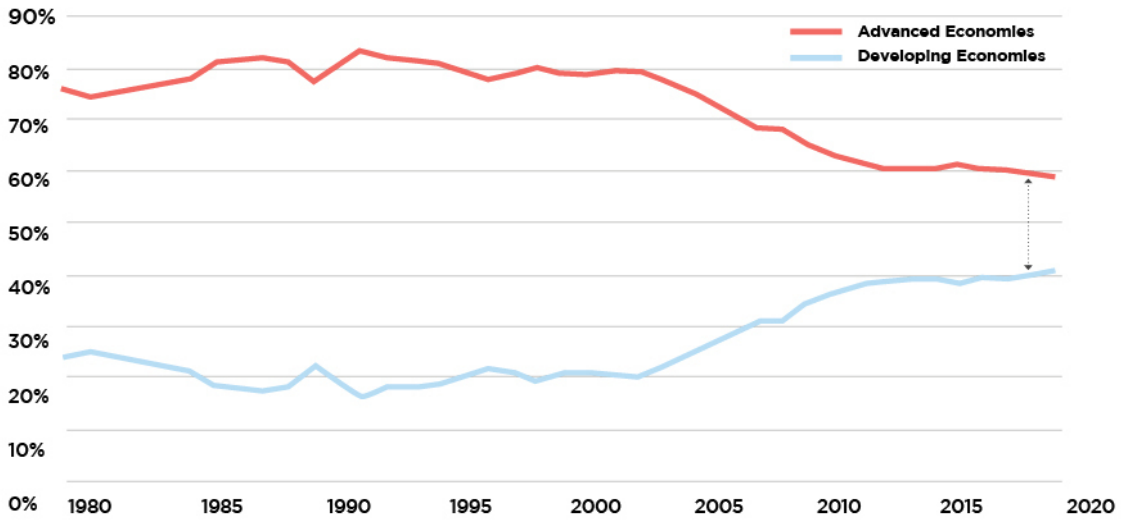
Source: Bloomberg

The United Nations predicts that by the beginning of the next century, Nigeria will be the third largest country on the planet with a population in excess of one billion.

Source: United Nations

World GDP Share 1980-2020

Advanced vs Developing Economies



Adapted from: PWC

How does all of this tie together?

After over a half-century during which the US was the world's lone military and economic superpower, a new multipolar world is emerging. This next world may be defined less by military might and more by an ever-shifting set of allegiances and agreements between wealthy and emerging countries seeking to benefit from global trade to grow wealthier and more prosperous.

Already, China and India together have become indispensable elements of the high-tech economy by providing expertise in manufacturing and supplying needed talent to high-income countries like the US and Canada, which are heavily vested in the success of the emerging countries that enable their prosperity.

SIGNAL 17

NEW LIFEWAYS

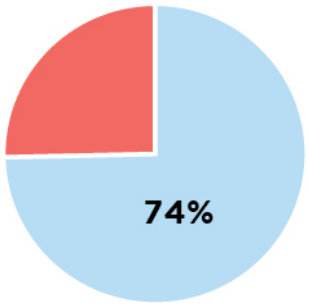
We will use digital technology to live locally and work globally.

What trends are converging to create this signal?

Shift to permanent work-from

A recent Gartner CFO survey revealed that over two-thirds (74%) of companies plan to permanently shift employees to remote work after the Covid-19 crisis ends.

Source: Gartner



Global outsourcing

Higher demand for purpose-led work

A new era of employment

Employers expect that by 2025, increasingly redundant roles will decline from being 15.4% of the workforce to 9% (6.4% decline), and that emerging professions will grow from 7.8% to 13.5% (5.7% growth) of the total employee base of company respondents.

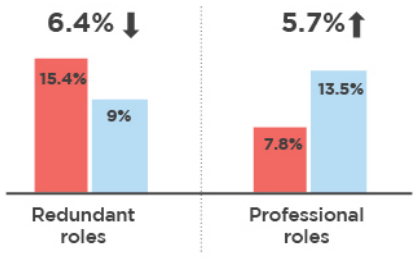
Source: World Economic Forum

Rise of gig economy

Global connectivity

SpaceX's near earth orbit satellite service Starlink is rolling out beta tests in underserved northernly communities, and in some cases connecting communites that have never had internet in the first place.

Source: Circle ID



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What is some evidence of this signal that we're seeing today?

Facebook announces investment in workplace collaboration tools, including social VR environment, Horizon.

Source: Facebook

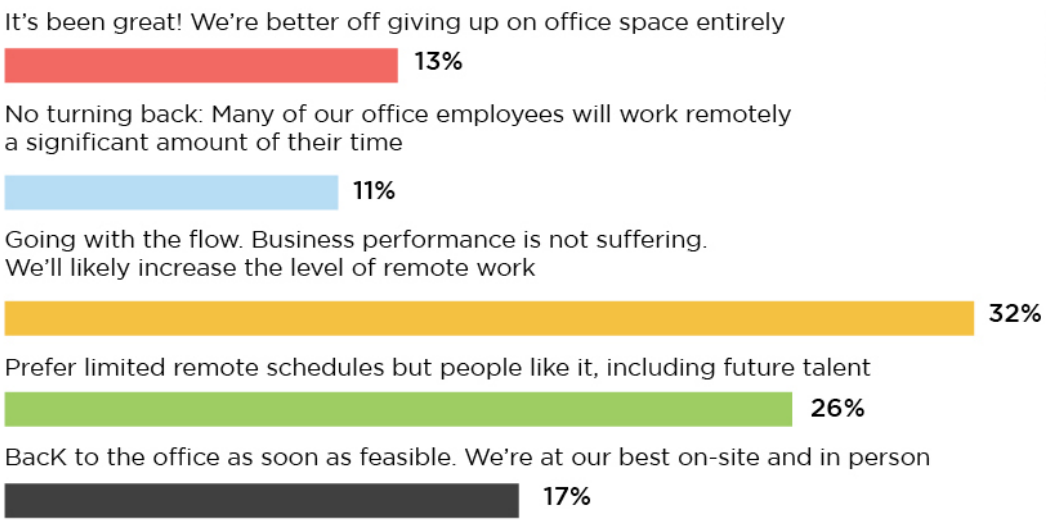
Google, Microsoft, Morgan Stanley, JPMorgan, Capital One, Zillow, Slack, Amazon, PayPal, Salesforce, and other major companies have extended their work from-home options, according to the largest human resources organization, SHRM.

Source: SHRM

Spain to test drive nation-wide 4 day work week.

Source: The Guardian

By design or defaul, most US companies are heading toward a hybrid office workweek.



Q: Which of the following statements best describes how you feel about remote work at your company?

Adapted from: PWC

How does all of this tie together?

The most lasting legacy of the COVID-19 pandemic may be its role in helping to solve a society-wide coordination problem that establishes a new set of employment standards for the workday and shifts our values toward a greater appreciation for stable and creative home lives. If so, we could see more people pursuing remote work to access more affordable real estate markets outside of major metropolitan areas.

Freed from the limitations of geography, people in a post-COVID world will be freer to live where they want while using digital technology and emerging connectivity technologies to access a truly global job market.

Appendix
Madeline Ashby Keynote Transcript

The FuturesLab event was kicked off with a keynote from author and futurist, Madeline Ashby, who challenged the group with a range of ideas drawn from the Signals. A transcript of these ideas is included in the following pages.

Madeline Ashby Keynote Transcript - FuturesLab 2021

First, thank you for having me with you, today. I'd like to thank Markku Allison at Chandos, and our OCADU Co facilitators Jayar LaFontaine and Emily Krause and Molly Connor, not just for their invitation but for all the hard work they've done to create and facilitate this event. To those of you who made use of the welcome package and Miro board, I can tell you that this team was excited and intrigued by your early participation — it really did make a difference. I've seen a sneak preview of what they have in store, and I think that as more of us emerge into the proverbial "new normal," sharing this experience together will yield critical insights about where we want to go in the future.

One goal of this event is that you take those insights with you when you leave. They can form a kind of toolkit for you as you navigate uncertainty. Because rest assured, the only certainty is that the uncertainty will not stop. The trends you examined in your welcome package and which you will continue discussing today are ongoing, and will remain so for the foreseeable future. Even with mitigation strategies, global temperatures will continue to rise. The fires will continue to burn. The ice will continue to melt. There will be other viruses. There will be other riots, and other regimes. There will be old feuds and new identities. There will be precarious economies and even more precarious relationships. There will be new loyalties and new values. You are going to be surprised. The rollercoaster is not going to stop. It may, if we're lucky, slow down long enough for us to catch our breath and enjoy the view. With that in mind, it is imperative that we develop the nimbleness necessary to experience surprises as pleasant.

This isn't to say that all is lost, or that we're all doomed. But during periods of increasing division and fragmentation, when resource concentration mirrors social polarization in its intensity, what real leaders do is show the way forward. They lead by example. They prove, through their decisions and how they implement them, that a stable and prosperous future is in fact possible. Real leaders, regardless of their field, are able to look at uncertainty and accept it, and maintain their focus on a vision. They build.

In our early discussions about this event, one theme that our gracious hosts at Chandos landed on was "building the future."

It's easy to think of "building the future" as purely figurative, or metaphorical. But in your case, in the case of the industries you represent, building the future is a literal act. During the ongoing COVID 19 pandemic, we've seen that to be the true: the so-called "black swan" or "wild card" event that futurists like me talk about did indeed arrive, and what changed first? Built environments. Suddenly there was talk of whether office towers and strip malls and even

school buildings were still relevant. Basic structures like checkout stands and ATM vestibules had to change, overnight. Suddenly cities gained a new understanding of the importance of sidewalk space, and bike lanes, and having available breathing room on public transit. Basic principles of designing for human habitation, like heating and ventilation, became life or death problems to grapple with. It was as though we were cast members in a post-apocalyptic science fiction film whose script we had yet to read, and the production designers had changed the set before we could even learn our lines.

Built environments have always, and always will, reveal more about the people who build and inhabit them than we would like to admit. If that were not the case, then archaeologists wouldn't still be studying the pyramids, or the buried cities surrounding them, for clues about how ancient peoples lived their lives. I was trained as an historian before I was trained as a futurist, which means that the way I learned to look backward prepared me for how to look forward. And in both disciplines, it's helpful to ask: what is the story being told by this structure? What does this building say about the values of the people who designed and built it?

Here's a fun game: imagine an alien civilization lands, and you, as a representative of the fields of architecture, engineering, or construction, are tasked with answering their questions. Imagine explaining to that alien civilization the existence of benches tilted so the homeless can't sleep on them. Or why so few public washrooms aimed at men have baby changing tables. Or why some buildings have ramps and elevators while others don't, or why lights are left on even though it kills, conservatively, one hundred million migratory birds per year in the United States alone. Or consider the recent heat dome over the Pacific Northwest, where the temperatures rose so high that a twenty-year-old light rail track in Oregon began to melt and warp, eventually shutting down the entire system.

How might a future historian explain these same things, to their students? How might that future historian explain that the people of the twenty-first century had designed not for their own century, but for the one that came before?

The disability rights movement has long argued this same point: we build what we design, and we design what we dream, and those included in our designs are those who are allowed to participate in a shared dream. And from that perspective it's not so unusual to consider a future with its own building codes. What are the standards for a strong future that can weather a few super storms? What are the codes to which our futures must be built? In the same way that we know certain shapes or materials are necessary to build a structure that lasts, we also know that some things survive the future and others don't. So, how do we build for the world to come? Do we mandate the inclusion of more radium in our white paints, so they create a better albedo effect? Do we declare air conditioning a human right? Wouldn't that first

involve declaring housing as a human right? And if we did declare housing a human right, just how fast would that market explode?

Jerzy Kosinski, known as being the author of Being There and Painted Bird and many others, said “And really the purpose of art — for me, fiction — is to alert, to indicate to stop, to say: Make certain that when you rush through you will not miss the moment which you might have had, or might still have.” And Stanislaw Lem, a hero to many of us who consider ourselves science fiction writers, said, “Science can explain the world, but only Art can reconcile us to it.”

So, in that spirit, I’m going to tell you a story. For a person in my line of work, stories do for futures what human figures do for scale models. You can look at multiple scenarios, many of them very detailed, and still not understand the real-world implications of them until they’re populated with characters. Characters in fiction do for various futures what the scale image of a human being does for a piece of concept art. Suddenly what was only imagined becomes real.

This story was inspired by several things. You will hear different news items in this story. Some if may sound very familiar to you. Some of it may sound new. If you’d like to talk more about what inspired me, or about our work, we’ll have a Q&A later.

***

“It says here you entered Canada as a climate refugee.”

Darcy nodded. “Yes, ma’am. I was born in Louisiana.” Where they still say ma’am, she thought.

“You don’t have an accent.”

“No, ma’am. I came here when I was five.”

The new arrivals panel at the Restoration Arms all nodded in unison. Each of the five were calling in from their units inside the Arms. They each wore chunky, hand-knit sweaters. It was still cold in Timmins. Truly cold. Fairy tale cold. Doctor Zhivago cold. Darcy suppressed a shiver of delight just thinking of it. When she was a little girl, snow seemed like a thing that only happened on Disney, or Netflix. Decades later, it was even rarer, and more magical. She had become a connoisseur of cold. She collected it — sometimes literally, if she remembered to bring an air sample kit on her travels. Bundling up, insulating oneself, was such a luxury. It was beyond that Danish word for coziness. It was a reminder of an earlier, simpler time. A time when winter was still a wonderland. The time they wrote the songs about.

“Where are your parents now?”

“My dad is still in Moncton. My other dad had the fungus.” She gestured vaguely at her chest.

“I’m sorry to hear that.”

Darcy never knew what to say in moments like this. Was she meant to say ‘Thank you’? Was she supposed to tell them it was okay now, and that she was over it? She wasn’t okay. She wasn’t over it. She didn’t know if she ever would be. She suspected that no one who had watched someone else die of mycelial hemorrhage could ever really be okay again.

One of the board members nodded more thoughtfully. His eyes were defocused. He was obviously reading her application over again, in another layer of his vision. The resolution wasn’t quite good enough on her end for her to see the data scattered over his retinae, but she suspected it was there and not on a screen. “And that illness happened after they had claimed asylum.”

Darcy suppressed a familiar spike of indignation. One day, she would learn to hear this question as something other than an accusation. Today was not that day, but it would come. Eventually. Possibly after she had a home of her own. Possibly once she had a place to belong, or a person to belong with, or any of the other things she wanted but other people took for granted.

“Yes, sir. The spores were latent, dormant, so they didn’t show up on the scan. They didn’t regenerate until later, after he’d caught the factory flu. His fever revived them.” Darcy didn’t know why she was still so embarrassed to admit this. It wasn’t as though they had deceived anyone. The spores really hadn’t shown up in the scan. Both her dads had passed the health scans. The only real question at the time was about their mental health, about the long-term impact of trauma and whether it would hinder their adjustment to Canada.

“Their marriage was annulled by the state of Louisiana, so they got forced apart in the Red Cross camp after the storm.” Darcy watched the reactions play out across their faces. Most of them looked appropriately horrified. She was aware that there was a ringer in the group — one of the people on the board wasn’t a person at all, but a personification of the building’s goals and values, which would act as a tiebreaking vote if the need should arise. But in a remote context, picking out which one was the avatar was more difficult. “We weren’t allowed a family-sized shelter, all three of us, because their marriage wasn’t on Louisiana’s distributed ledgers any longer. That’s when PaPère contacted the Acadian Repatriation Centre. They sponsored our move to Moncton, on account of my dad’s French.”

“And your French? Is it good?”

She smirked. “Oui, monsieur.”

The French was a point in her favour; slightly less than fifty percent of the population of Timmins was still Francophone. This was a reason for her to feel confident. And Darcy knew that these answers weren’t technically allowed to have any bearing on whether she was accepted by the condo board or not. The goal of the questioning was much the same as going through customs — it was meant to needle her, just slightly, to see how she might respond. It was illegal for the condo board to look at her wearable data for the purposes of the interview. They couldn’t ask to see her heartbeat or track her pupils, because that mean asking for health data. But she had no idea what kind of software was in their chat program. Every province had slightly different standards of what was allowed; the privacy commissioner was releasing a white paper next month about bringing forward a national standard of surveillance ethics, in partnership with the commissioner for artificial intelligence standards.

The board member who seemed the most business-like, and who Darcy suspected of being the most artificially intelligent, asked, “What drew you to the Restoration Arms?”

Darcy smiled. Most condo boards loved hearing about how great their communities were. The Restoration Arms was no different. “I really appreciate historic sites,” she said. “I guess it’s a holdover from Louisiana. From my dads. I think the Restoration Arms has a really distinctive history, and I’d like to be part of it.”

The board member continued, “Do you have an interest in dividend developments?”

Darcy nodded. “I’ve visited a few of them, across the country. I think they’re going to be for this century what WPA projects were in the last one.”

Another board member, this one seeming much younger, chimed in: “Really? Where? Do you have a favourite?”

“I like the buildings outside Banff. They’re the ones that seem the most alive.”

It was true. The dividend developments outside Banff were made of living, self-healing concrete and active photovoltaic louvers that unfolded themselves against the cold like birds fluffing their feathers against a chill wind. Its grey water recycling system fed a vertical farm that hung in the centre of the tower, like a panopticon of plants. The pigments changed based on exterior air quality to communicate warnings to the residents, much like a forest might warn itself of impending fire. It smelled green, inside.

“Alive in the sense of the building, or alive in the sense of community?”

“Both,” Darcy said. “Ecology is ecology. Ecosystems are ecosystems.”

“It says here you’re a dendrologist.”

“Yes. I study networks of trees, and how they transmit warnings to each other across forests via hormones and sugars in root systems.”

One of the board members smiled. She was an older woman with pink hair and a lot of piercings. “So you’re saying that trees are gossips.”

“They are indeed,” Darcy said. When the others on the call said nothing, she added, “I think that’s something else that drew me buildings like the Restoration Arms. I think the way your community makes decisions is very...tree like. Very arboreal, for lack of a better term.”

In fact, Darcy did have a better term. Mycorrizhal was the term. But it was easier to simply say “symbiotic,” and it didn’t speak to the shared resource management that emergent communities like the Restoration Arms practised. “Forests don’t fight for sunlight,” she said. “They don’t fight for water, or nutrition, or any of the other resources you might think. Forests as a whole don’t do that. Individual trees or plants might, but not if they’re part of a healthy forest, and not if they have a healthy relationship to the surrounding fungi and mosses. Forests delegate. They share. And I think that’s what all these dividend developments have been doing, since the payouts. They’ve been deciding how best to manage the resources that came from the payouts, after the court rulings.”

In the United States, the Fossil Feuds had resulted in payouts to individual states or cities, to do with as they chose. In Canada, the payouts from extraction firms turned into public-private partnerships in development, in addition to payouts, to create housing and green infrastructure. As part of the initial payout and the ongoing dividend structure, community groups were given stewardship over new developments that adhered to new standards of energy and material integrity. These buildings would not melt into sand. Their windows would not freeze and contract and fall down to kill the people below. They would maintain thermal balance. They would not suffocate the elderly. That was the promise.

“And that’s why you want to come here?” one board member asked.

“Well, yes,” she said. “And also, I want to be married.”

There was an awkward silence.

“Really?” the pink-haired woman asked. She looked at Darcy as though she’d grown another head. It was obvious that they hadn’t expected her, an otherwise very modern woman, to be interested in this particular act of germination. Clearly, she had no idea what it was like to try dating in a tiny town with two of the most gossipy dads in the universe.

“Yes. Your building has an excellent track record of putting single people together. You’ve made it a focus of your mission, in part to protect the Francophone community in Timmins. And because I’d also like to raise my children bilingual, like I am…” She shrugged. “It seems like an ideal place to settle down.”

“So you have a mission of your own.” The man who asked her sounded rather intrigued.

“Doesn’t everybody?” Darcy asked. “I looked at the future I wanted to have, and I looked at how to get there. And I think that living with you, sharing a network with you, is the best way for me to achieve that dream.”

THE END

AUTHOR’S NOTE

This story, called “Restoration Arms,” is one of many possible futures inspired by the nine trends chosen by attendees of the Chandos FuturesLab event, and curated by facilitators at OCAD U CO. While I observed the process of winnowing the nine trends from a much larger group, I myself didn’t vote so as to influence my choice of subject matter. In other words, I didn’t choose these trends, because I wanted to speak to the concerns named by the group rather than just my personal favourites. With that said, some of the tensions present in the trends are also the tensions that I believe make for compelling future fiction, namely those surrounding climate change, urbanization, artificial intelligence, and new forms of collaboration and community development. But this is only one story, and really almost the beginning of a story that could go in many different directions, and contain many different characters on multiple dramatic trajectories. You can write your own story involving these trends. History certainly will.

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